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AGRICULTURAL Chemicals

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- Systemics for Bots
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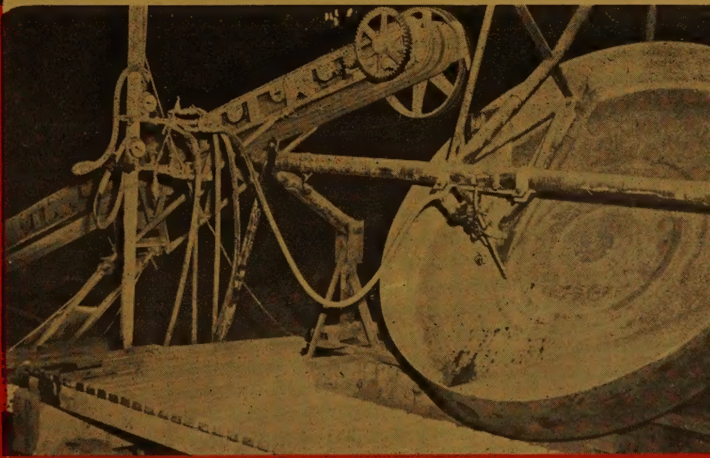
- Inventory Control
- Semi-Granulars Featured at Fertilizer Round Table
- Maleic Hydrazide on Tobacco
- Convention Reports: ESA, C-VPFA, Florida, Oregon Hort. Societies
- APPLICATOR SECTION

DECEMBER, 1959



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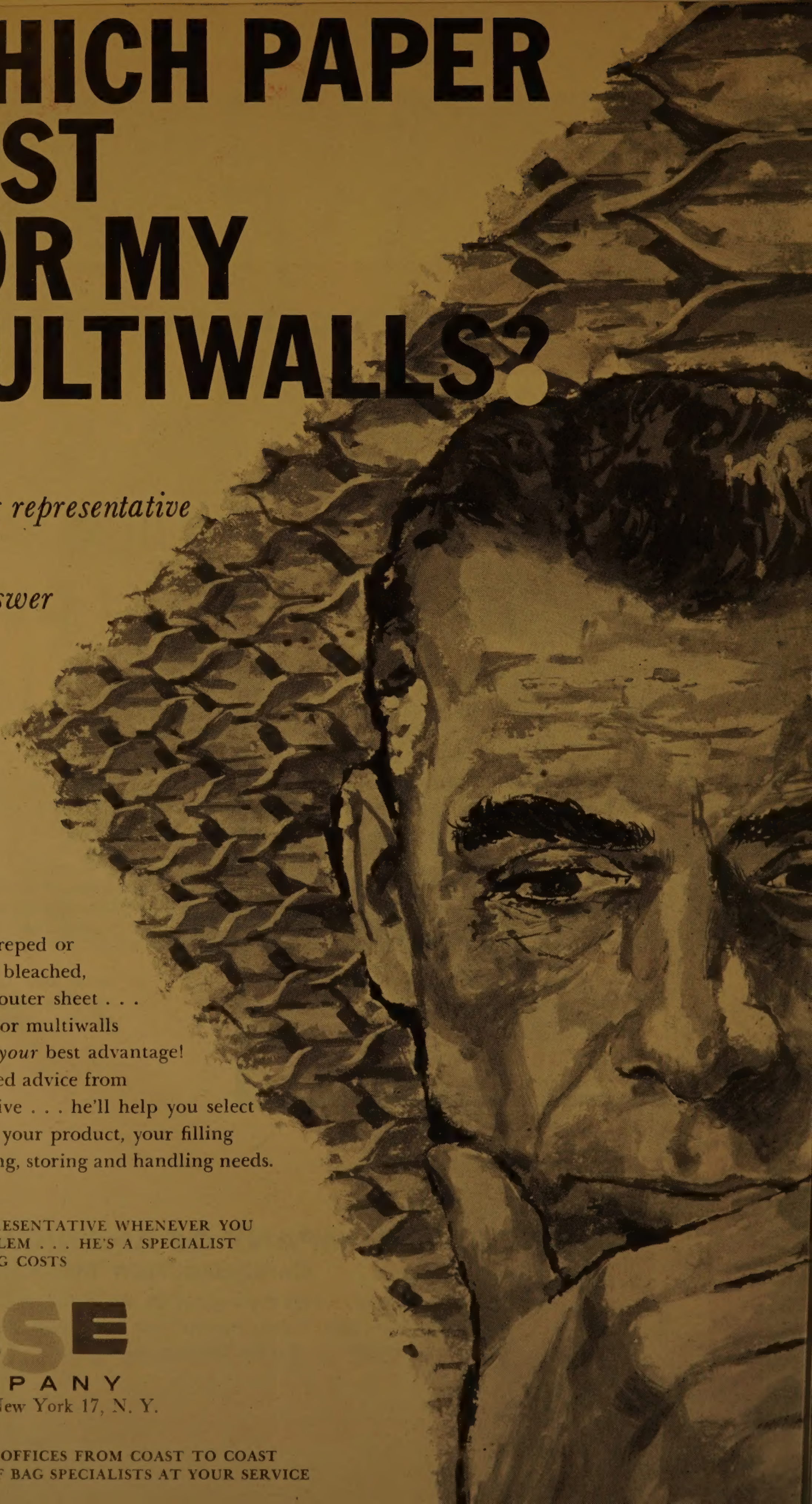

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This Month's Cover

Modern Fertilizer technology requires improved production equipment. Top photo shows inclined pan granulator (see story on page 30); Lower left: elaborate dust control system at CIL granular fertilizer plant at Chatham, Ont. Lower right: Reactor tee and other components of pre-reactor for liquid raw materials in mixed fertilizer manufacture. Both subjects discussed at Fertilizer Industry Round Table (see page 46).

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Vol. 14, No. 12 **December, 1959**

AGRICULTURAL *Chemicals*

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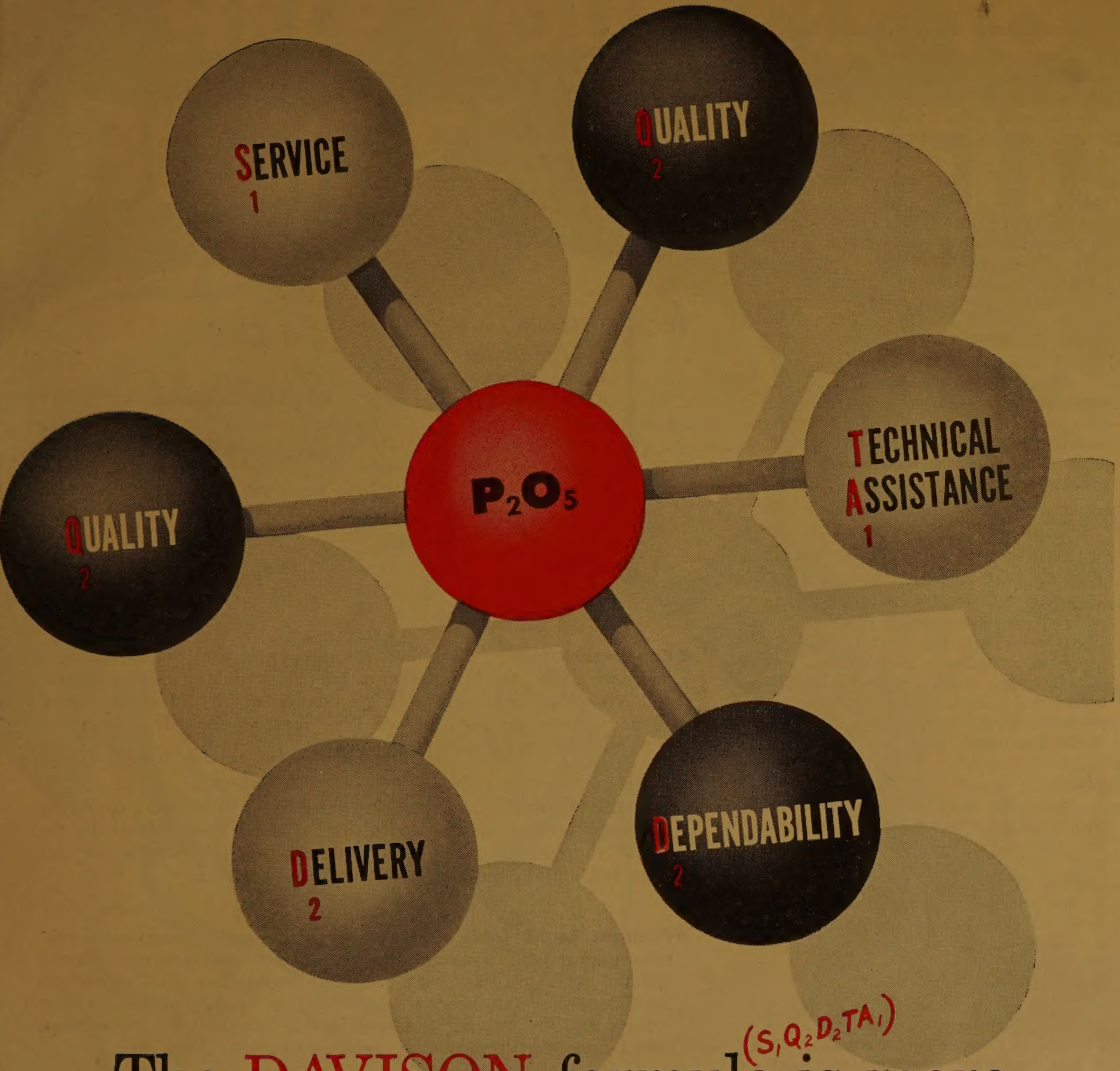

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International Market Round-Up

Trading of fertilizers in foreign markets continues very strong with competition being quite severe in most areas. The following are a few key areas where large quantities of fertilizer are being purchased:

India:

The Indian government is presently conducting negotiations for the purchase of the following:

108,000 tons	ammonium sulfate
41,800 tons	ammonium sulfate nitrate
41,000 tons	calcium ammonium nitrate
39,800 tons	urea
10,000 tons	nitro phosphate

While negotiations are still going on, the latest reports indicate that Japan and Europe have offered against the entire requirement of ammonium sulfate and urea. Very severe competition is being encountered.

Korea

Korea, as always, continues to purchase very sizeable quantities of fertilizer. During September, approximately 50,000 tons of urea were purchased from Japan at approximately \$83.00-\$85.00 per metric ton, F.O.B. Japanese ports, in addition to about 30,000 tons of ammonium nitrate from the United States and Canada which were sold at prices ranging from about \$63.00 to \$73.00 per metric ton.

Spain

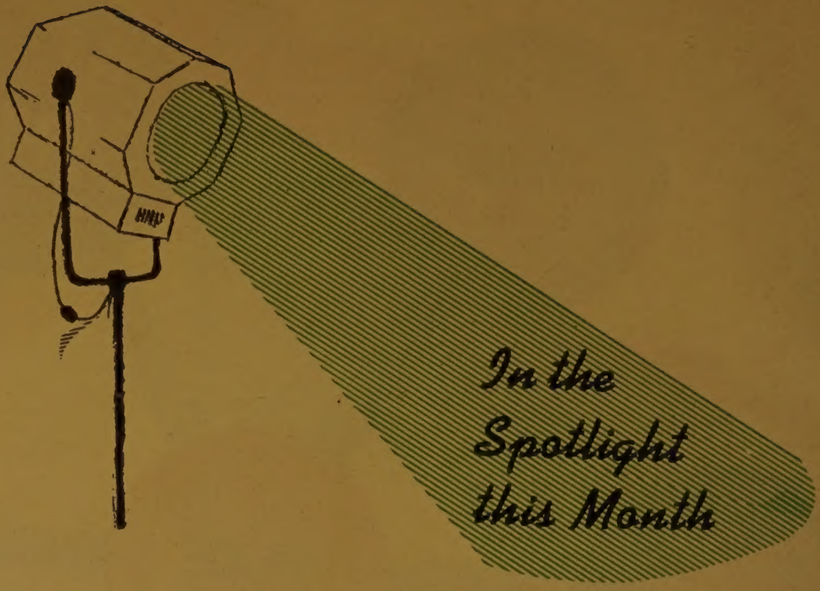
Since the liberalization of trade in that country, inquiries have been brisk for ammonium sulfate and phosphate rock. While Europe is the principal supplier of nitrogen, and North Africa is the principal supplier of phosphate rock, the United States has been able to participate in this business.

South Africa

This country, which is facing a domestic over-supply of nitrogen capacity due to the erection of a urea plant, is still importing approximately 50,000 tons per year of ammonium sulphate at delivered prices which are below U. S. domestic prices for ammonium sulphate. Source of supply is western Europe. The United States, formerly a large supplier of ammonium sulphate in this market, has been forced to concede to European suppliers.

The foregoing will indicate the very severe competition that exists in worldwide markets as far as pricing is concerned and the world community does not appear to feel any optimism or to be looking for any improvement. While the United States enjoyed a fertilizer year that was one of the best ever, world stocks of nitrogen have been accumulating at a rapid rate and the pressure for sales, regardless of price, has been mounting up. Japan has cut back her urea production to approximately 80% of capacity, but is still very far from being able to sell even that limited production.

Compiled by International Ore and Fertilizer Corp., New York.



In the Spotlight this Month

- **Pan Granulators . . .** For low volume granulation of low nitrogen fertilizer grades, the installation of the pan granulator offers practical and economical advantages. In granulation of high nitrogen grades, ammonia losses on the order of 19% seem to preclude competition with the continuous rotary ammoniator. Page 30.

- **Inventory Control . . .** Concluding installment of a report reviewing inventory systems for the agricultural chemical formulator. In the case of consignment selling to formulators, the authors point out that time and dollar limits are good controls. Page 33.

- **Fertilizer Round Table . . .** Semi-granulation or "minimum equipment granulation" is practiced to advantage by operators with limited demand for a fertilizer with properties better than good pulverized fertilizer,—but not necessarily as good as true granulars. Other reports at 1959 meeting reviewed in this issue concern formulation calculations, fertilizer mixing, preneutralization. Page 46.

- **Agricultural Applicator . . .** A panel of experts from the pesticide industry reported to agricultural aerial applicators at the NATA meeting on new products for 1960, and on general precautionary measures to be observed in handling agricultural chemicals. This month's *Agricultural Applicator* section features reports on the NATA meeting in New Orleans and the Texas Aerial Applicators meeting in Orange, Tex. Pages 55-68.

- **Fertilizer Solutions . . .** Liquid fertilizer solutions manufacturers agreed that they prefer to control application equipment rather than have the farmer apply liquid fertilizers himself. They feel they can do a better job of applicating than the farmer can, and avoid having the fertilizer blamed for poor application techniques. Page 50.

- **Systemics for Control of Bots . . .** Of eight systemic insecticides investigated for effectiveness against *Gasterophilus nasalis,* Dowco 109 was partially effective; Dipterex in feed at 37.5 mg/kg appears safe and practical; Ruelene and DDVP by stomach tube were toxic to the horses at effective dosages. Page 41.

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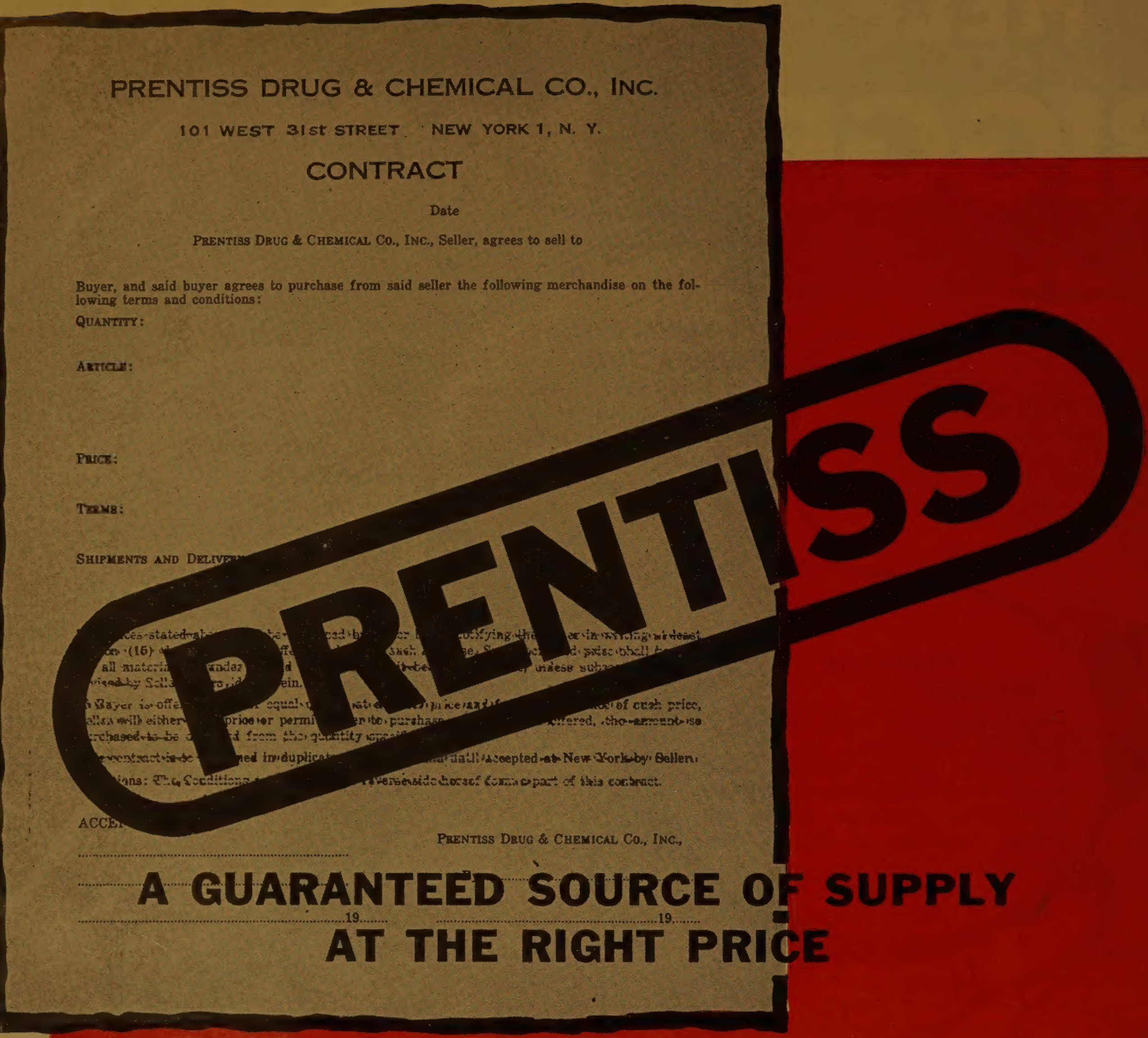

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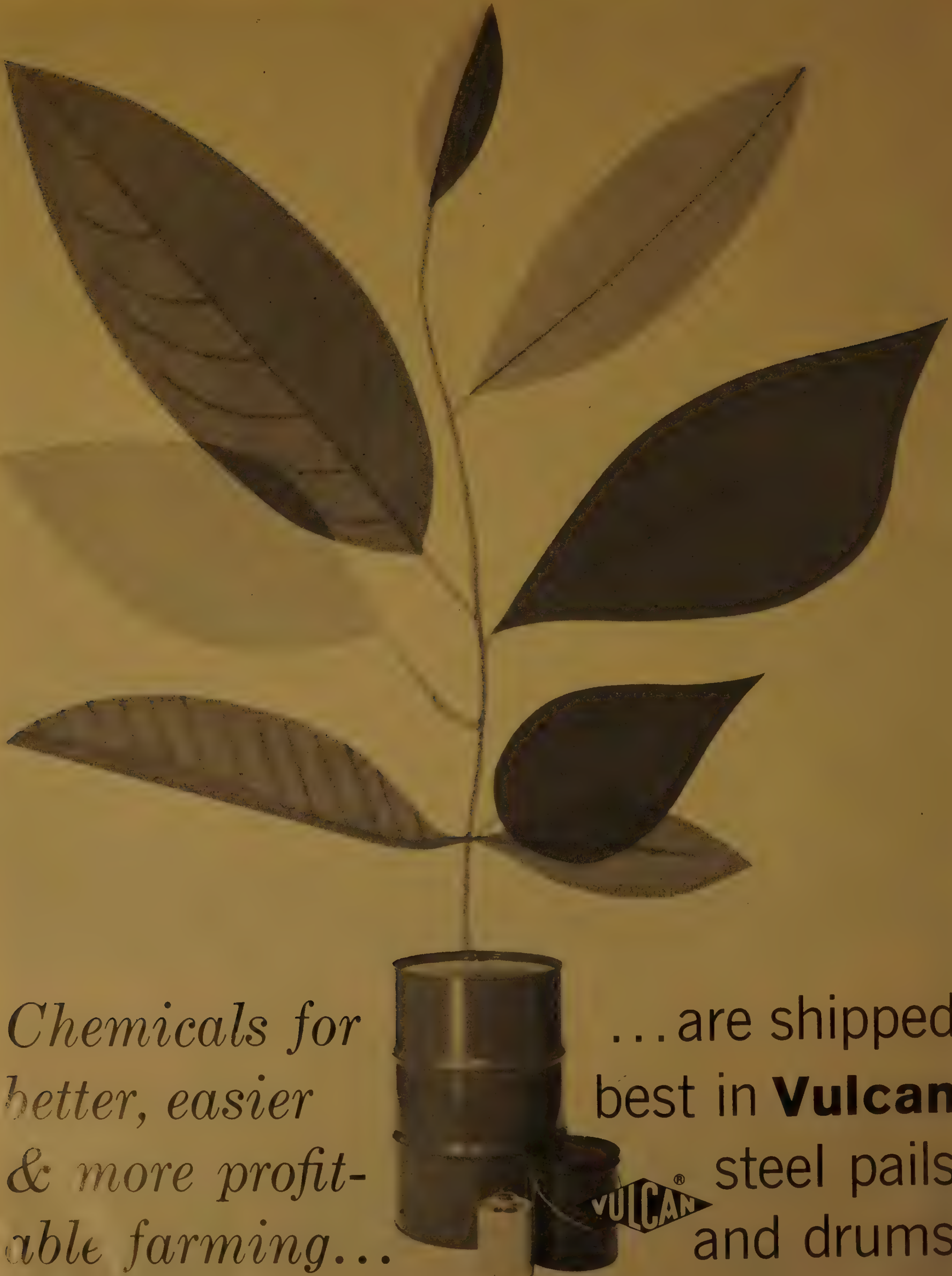

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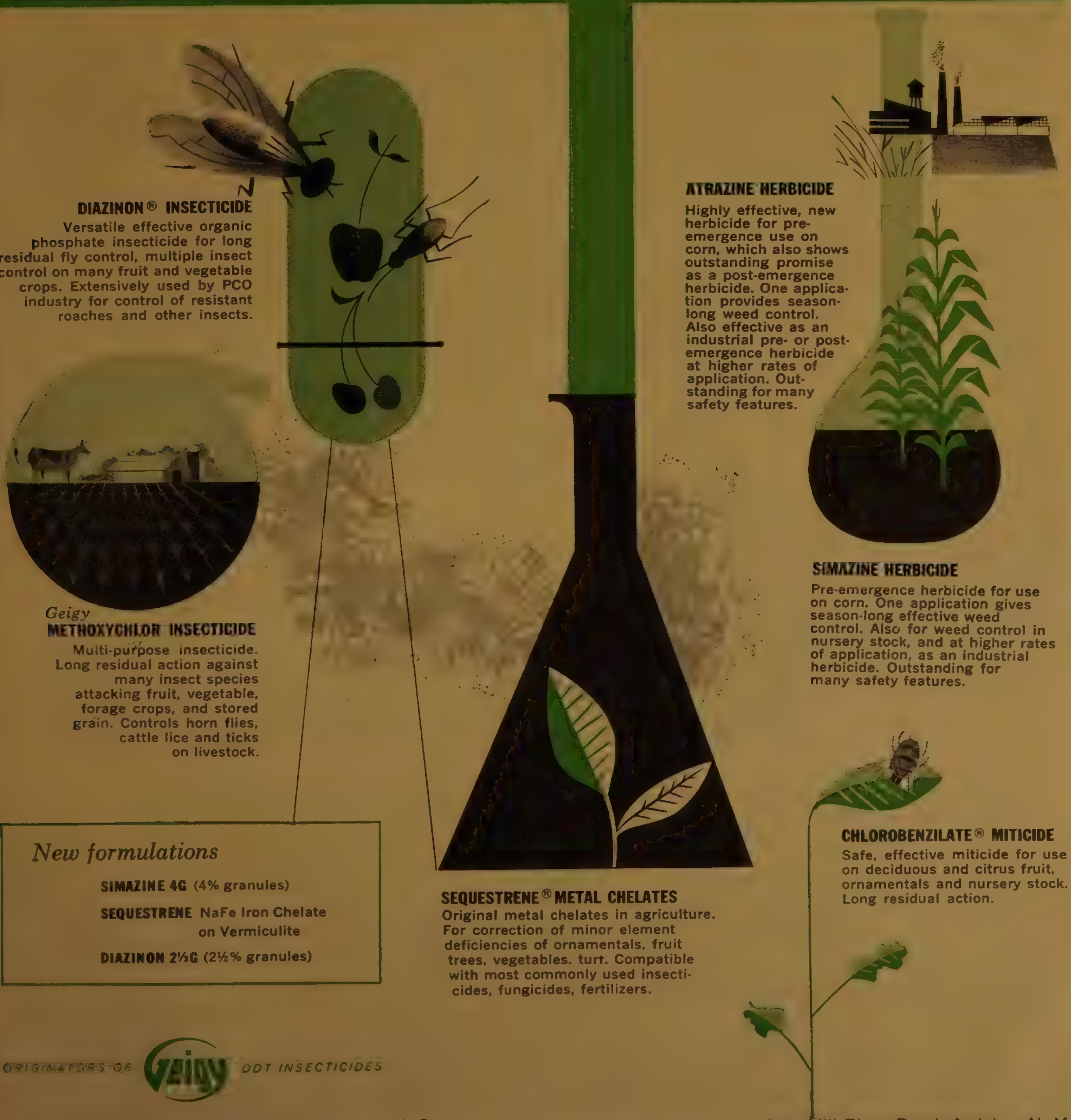

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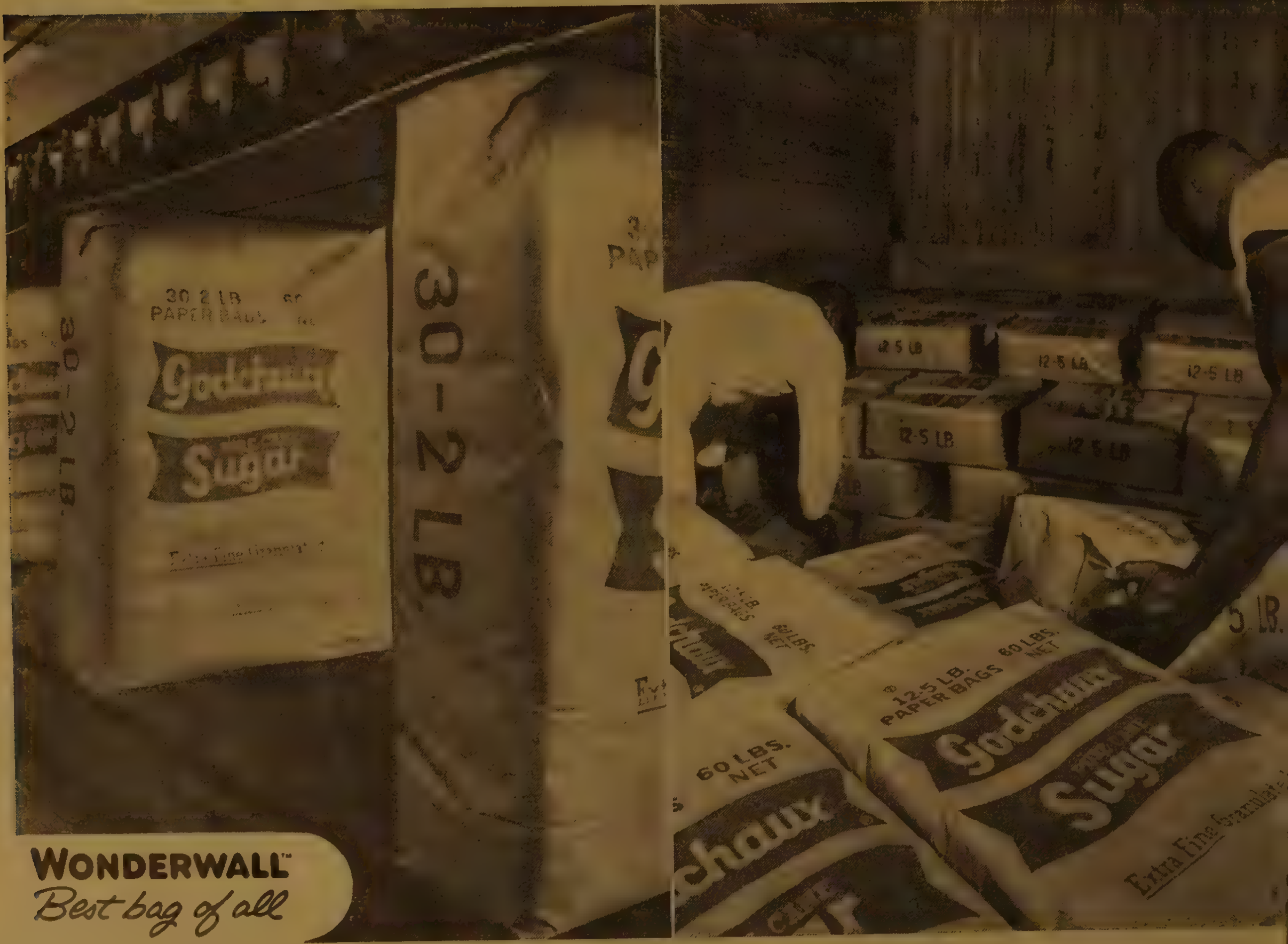

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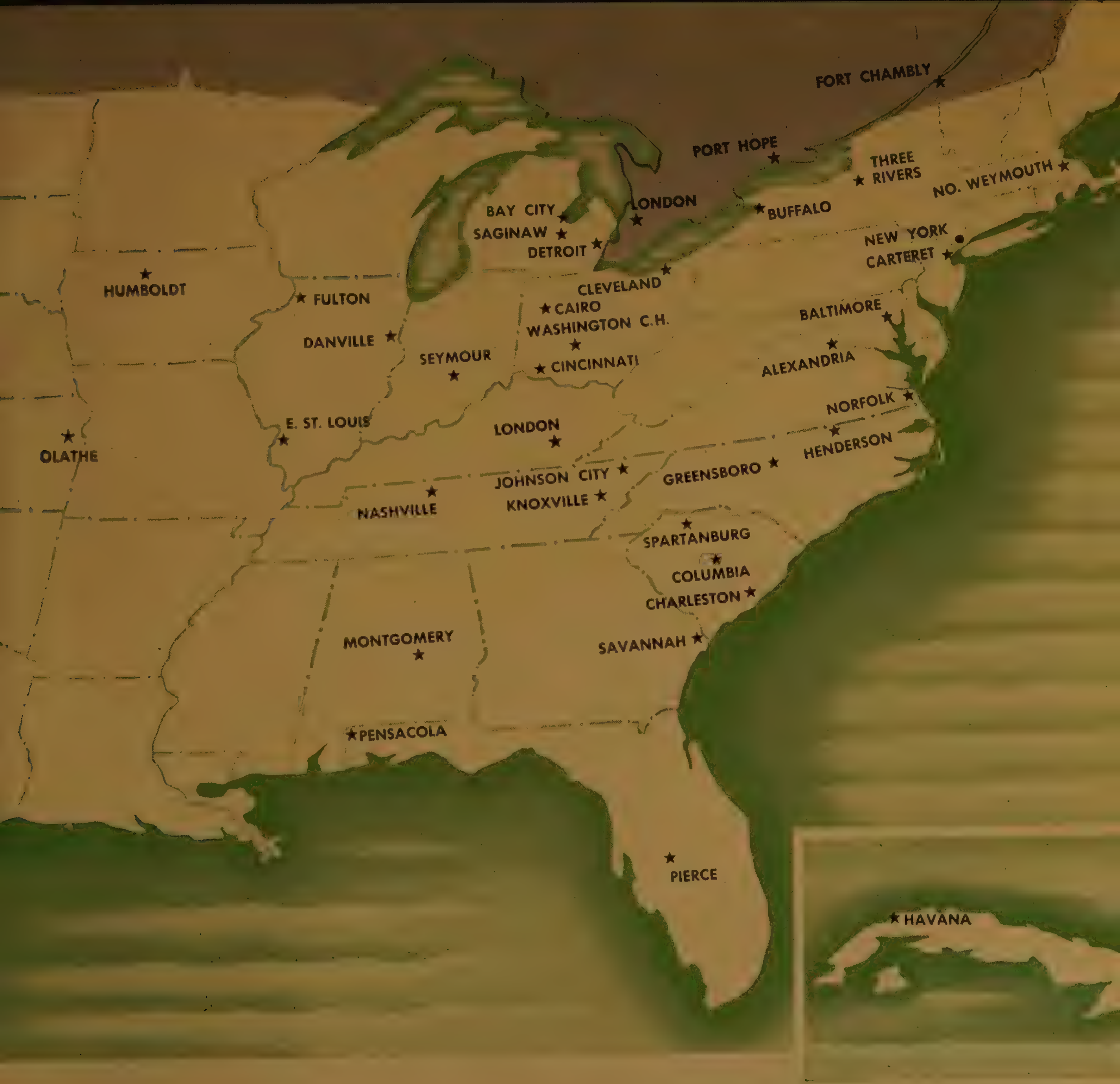

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MEETING CALENDAR

Dec. 7-9 — 46th annual meeting, Chemical Specialties Manufacturers Assn., Mayflower Hotel, Washington, D. C.

Dec. 7-10—Western Canadian and North Central Weed Control Conferences, Royal Alexandra Hotel, Winnipeg, Manitoba, Canada.

Dec. 9-11 — International Crop Protection and Pest Control Exhibition, Seymour Hall, St. Marleybone, London, England.

Jan. 6-7—Pesticide Conf., University of Wisconsin, Madison.

Jan. 6-8—Northeastern Weed Control Conf., 14th annual meeting, Hotel New Yorker, New York.

Jan. 12-13—Ohio Pesticide Institute, 13th Annual Meeting, Lincoln Lodge Columbus, Ohio.

Jan. 13—New Mexico Agricultural Chemical Conf., New Mexico State Univ., Univ. Park, N. Mex.

Jan. 14, 15—Beltwide Cotton Production Conference, Memphis, Tenn.

Jan. 13-15 — Agricultural Ammonia Institute, 9th Annual Convention, Statler-Hilton Hotel, Dallas, Tex.

Jan. 14-16 — California Agricultural Aircraft Association, 10th Annual Convention, El Mirador Hotel, Palm Springs, Calif.

Jan. 19-21—California Weed Conf., Sacramento Memorial Aud., Sacramento, California

Jan. 20-21—Arizona Fertilizer Conf., Univ. of Arizona, Tuscon.

Jan. 20-21 — Northwest Agricultural Chemicals Industry Conf., Benson Hotel, Portland, Ore.

Jan. 21—Northeast Region, National Plant Food Institute fertilizer workshop, Hotel Hershey, Hershey, Pa.

Jan. 25-26—Indiana Pesticide Conf., Memorial Center, Purdue Univ., Lafayette, Ind.

Jan. 27-28—Illinois Custom Spray Operator's School, Univ. of Illinois, Urbana, Ill.

Jan. 28-29—Colorado Agricultural Chemicals Assn., Annual Meeting, Cosmopolitan Hotel, Denver.

Feb. 1-5 — Purdue Pest Control Operators' Conference, Lafayette, Ind.

Feb. 6-8—National Cotton Council, Hotel Statler, Dallas, Texas.

Feb. 9-11 — Texas Agricultural Chemicals Conference, Texas Tech. College, Lubbock, Texas.

Feb. 17-18—Alabama Pest Control Conf., Alabama Polytechnic Institute, Auburn, Ala.

Feb. 21-23—9th Annual Agricultural Aviation Conference, Texas A&M College, College Station, Texas

March 22-23—Western Agricultural Chemicals Asso., Miramar Hotel, Santa Barbara, Calif.

Apr. 6-7—LSU Forestry Symposium, Louisiana State Univ., Baton Rouge.

Oct. 17-18—Fertilizer Section, National Safety Congress, Chicago.

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Pick the product you want to formulate, and you'll find a PANASOL Solvent you will want to use in your formulation. PANASOL Solvents offer high aromaticity and solvency to help you make quality products *competitively* priced. The low phytotoxicity of PANASOL RX-4 and AN-2K permits you to use them with assurance in crop sprays. Mild odor and light, clear color of PANASOL AN-2 makes it suitable for household spray formulations. PANASOL AN-1 and AN-3 are useful in such specialty formulations as Insecticide-Fertilizer combinations. The ease with which PANASOL Solvents formulate with active ingredients simplifies manufacturing.

The whole PANASOL Solvent story is in the hands of your Amoco Chemicals salesman. He's ready to bring it to you when you call. Or write for Bulletin A2. Your inquiry will receive immediate attention.

Typical Properties

PANASOL Solvent No.	AN-1	AN-2	AN-2K	AN-3	AN-5K	RX-3	RX-4
Distillation 2F., ASTM	D-158	D-158	D-158	D-158	D-158	D-86	D-850
IBP, °F.	400	420	398	450	440	276	282
EP, °F.	494	520	525	534	705	—	—
DP, °F.	—	—	—	—	—	360	320
Specific Gravity, 60/60°F.	0.974	0.986	0.950	0.997	0.943	0.843	0.865
Aromatics, Vol. %	98	99	82	99	71	76	94
Mixed Aniline Point, °F.	55	54	75	54	100	84	59
Flash Point, COC., °F.	190	210	200	225	220	—	—
Flash Point, TCC., °F.	—	—	—	—	—	82	85
Solubility*							
DDT (tech.)	39	42	39	43	28	25	29
BHC (tech.)	29	34	41	31	43	23	28
Lindane	9	10	11	14	5	10	15
Dieldrin	26	28	26	27	25	26	29

*Wt. parts in 100 parts solution at 32° F.

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CORPORATION

910 South Michigan Ave.,
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THEY MOVE MOUNTAINS TO SHIP CARLOADS

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To ship you the highest quality triple superphosphate, Cyanamid's "walking giants" scoop up twenty-four ton bucketfuls of high-grade phosphate ore at the rate of one ton every one and six-tenths seconds. To make one carload of TREBO-PHOS*, approximately 340 tons of ore are mined. This tonnage dwindles as the ore is washed, screened, graded and dried. Much of the remaining is used to make highly concentrated phosphoric acid which, when added to fine rock, makes triple superphosphate. Quality is checked at every stage . . . the result: a triple with controlled porosity.

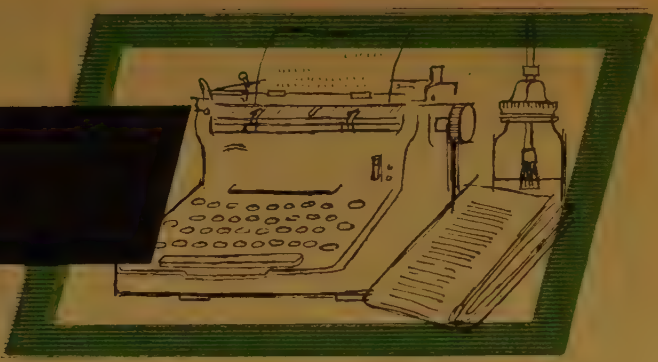
Its characteristic: ammoniation rates as high as 5% without evolution of ammonia fumes, yet TREBO-PHOS particles will not take on excess amounts of moisture. The finished product is a dry, drillable, well-conditioned fertilizer. American Cyanamid Company, Agricultural Division, New York 20, N. Y. **TREBO-PHOS is American Cyanamid Company's trademark for its triple superphosphate.*

CYANAMID

TREBO-PHOS
TRIPLE SUPERPHOSPHATE

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

EDITORIALS



WE have heard a lot of rumblings and grumblings around the agricultural chemicals industry over the past few years about farmer co-ops, and the competition they offer to commercial producers of fertilizers, pesticides, etc. The thorny subject was brought out into the open a few weeks back by a top official of a well-known company (See pg. 77 of this issue) who pointed out that, unless some action is taken to put the co-ops on an equal tax basis with those companies who sell the commercial market, there is strong possibility of "eventual shutting down of fertilizer operations conducted by the major chemical companies."

If, as is the case, we are dedicated in this country to the free enterprise system, it is obviously unfair to tax one producer and let a competitor operate in a tax vacuum. We say this whether the competitor is another commercial producer, a farmer co-op, an agency of the government such as TVA, or an endowed so-called non-profit institution. Every competitor for the buyer's dollar should have to pay taxes and should be faced with the necessity of making a profit if he is going to continue his operations. It is a rigid and necessary discipline for all to have to stand up once a year and face either a board of directors or one's own bank account to justify his stewardship and defend his right to continue in business.

We know a little about such situations ourselves, as there is competition in the publishing business that neither pays taxes nor has to earn a profit. As far as we are concerned,—whoever it is that is doing the competing, the government has an obligation to see that all compete on an equal footing.

IN a talk last month before the annual meeting of the National Agricultural Chemicals Association, Louis F. Czufin, advertising manager of California Spray Chemical Corp., quoted some highly appropriate remarks on the subject of advertising and advertising budgets originally phrased by Charles Mortimer, president of General Foods. "The surest way to overspend on advertising," said Mr. Mortimer, "is not to spend enough to do a job properly. It's like buying a ticket half way to Europe. You have spent some money, but you just haven't arrived."

To this observation we are impelled to add a hearty "Amen," with the further comment that the portion of the advertising budget which is most frequently overlooked, in the ag chemical field at least, is the provision for carrying the message on the new product, or the old one for that matter, to the numerous agencies along the line between basic manufacturer and final end user. We have seen cases, too numerous to recount, where bundles of money were spent on consumer copy to sell a hot new product to the farmer or the householder, and nothing to put the message across to the formulator, the distributor, the dealer, the experiment station staff or the county agent.

And, we might add, a high percentage of products employed in this way never moved off first base. The real experts in the field, the group of "pros" whose recommendation, or lack of it, can make or break a new product, never got the message on the new material, simply because it was never beamed to them.

Incidentally, an old rule of thumb in the advertising business, which is apparently too

(Continued on Page 97)

Photo: Courtesy of Fisons, Ltd., England

PAN GRANULATORS for FERTILIZER

By John Hardesty

Fertilizer Investigations Research Branch
Soil and Water Conservation Research Division
ARS, USDA, Beltsville, Md.

PAN granulators are in use in several countries for granulating superphosphates and mixed fertilizers (*1, 2, 4*). Relative to the constant search for improvement of processing equipment, there is considerable interest in the United States regarding the suitability of the pan for ammoniating and granulating high-analysis fertilizer mixtures. Current processing practice in the United States differs from that in most countries in that it often includes the use of sulfuric or phosphoric acids in conjunction with a quantity of ammoniating solution in excess of that necessary to ammoniate the superphosphate present in the mixture. The quantity of solution phase present in the original formula is sometimes in excess of that required for agglomeration, and requires the recycling of product fines to dry the slurry and bring the mixture into an agglomerate state. Such processing places requirements on equipment that are not normally present when a solid is merely wetted with the minimal amount of water for the purpose of bringing it into the agglomerate state, such as is the general practice with pan granulators.

Technical literature on the operation and efficiency of pan granulators for mixed fertilizer production is sparse, but there appears to be sufficient information available to justify a rather broad evaluation of this equipment for ammoniating and agglomerating high-analysis fertilizers as they are formulated in the United States. Such an evaluation of the pan granulator on the basis of its present development is the purpose of this paper.

The two broad classes of pan granulators are the horizontal pan which is primarily a batch mixer, and the inclined pan which is used for continuous granulating operations.

The Horizontal Pan

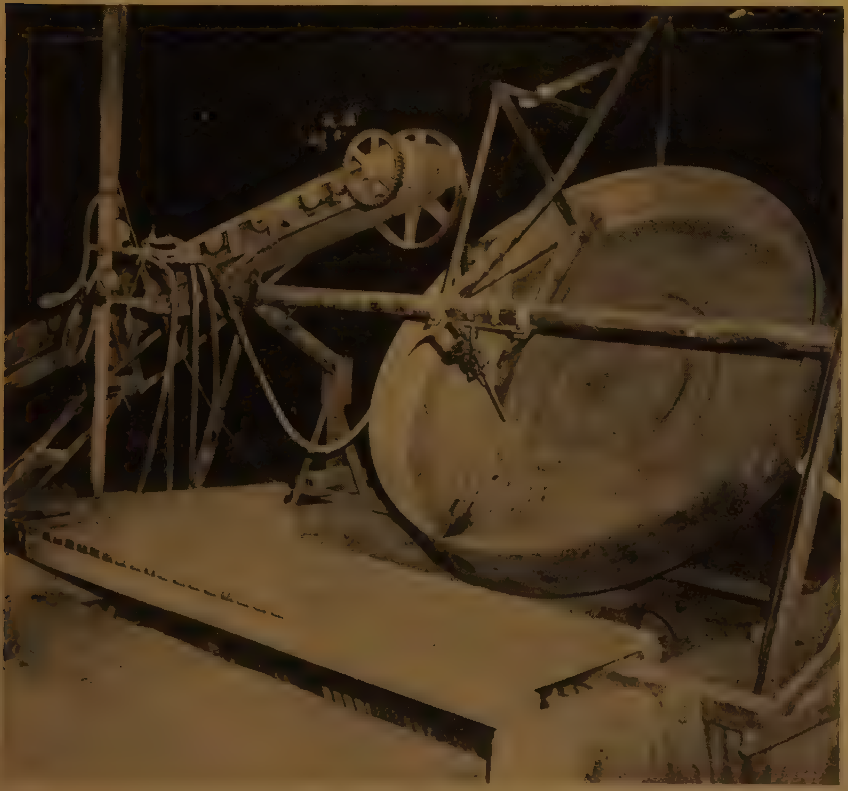
THE Eirich machine, a German horizontal-pan mixer, was used by Nordengren in Landskrona, Sweden, soon after it came on the market in the early thirties, for making experimental batches of granulated superphosphate and dicalcium phosphate (*6*). The horizontal pan mixer (Figure 1) proved to be very well adapted to the batchwise granulation of superphosphates and mixed fertilizers. It gained widespread commercial use in the United Kingdom during the early development of mixed fertilizer granulation (*4*). While it has been largely replaced by rotary cylinders, which offer the advantage of continuous operation, the Eirich mixer, or similar type of batchwise equipment, is still being used to some extent in several countries for granulating fertilizers.

A typical horizontal pan (Figure 1) is 7.5 feet in diameter and 18 inches deep. Rotation of the pan and mixing blades (which are eccentric to the pan) in opposite directions maintains the charge in a constant state of agitation. The blades extend to within one-half inch of the bottom of the pan, and the inner wall of the pan is cleaned by a stationary scraper. Sufficient water is sprayed on the charge to give the required degree of plasticity for the formation of agglomerates. Agitation is continued for 2 to 3 minutes to complete agglomeration and to compact the agglomerates. The granules are then discharged through a floor valve to a smoothing hopper and fed at a controlled rate to a dryer.

Observation of commercial operations in the United Kingdom (*4*) and experiments in this laboratory (*3*) indicate that the mechanical action of the horizontal pan mixer provides an intensive agitation of the wetted fertilizer that results in the rapid formation of agglomerates. This is attributable to the uniform distribution of liquid on the surface of solid particles. Present formulation practice in the United States, however, requires processing equipment suitable for high ammoniation rates and for continuous, rather than batch, operation. The horizontal pan does not meet these requirements. Tests in this laboratory with the addition of anhydrous ammonia at a point 6 inches beneath the surface of an 8-inch bed of ordinary superphosphate at the rate of 5 pounds NH_3 per unit of P_2O_5 in the covered, rotating, horizontal pan gave ammonia losses of about 25%. Granulation was not as satisfactory as when superphosphate alone was granulated with the addition of water in the same equipment. After being discharged into a retaining hopper the warm product set up over a period of 10 minutes so that it would not flow from the hopper. In commercial operation, the use of a surge hopper following the batch granulator is necessary if a uniform flow of material through the dryer and maximum drying efficiency are to be maintained. Assuming that modification of the horizontal pan would make it an efficient ammoniator, it does not seem likely that a surge hopper can be made to operate effectively on moist, hot, ammoniated products. Thus, the horizontal pan granulator is not well adapted and has not been used commercially for continuous formulation and processing of mixed fertilizers as practiced in the United States.

Figure 1 (on facing page): Horizontal Pan Granulator.
Figure 2 (below): Inclined Pan Granulator.

Photo: Courtesy of Commonwealth Fertilizers and Chemicals, Ltd., Australia



The Inclined Pan

FOR many years, the finely-ground raw materials for cement manufacture have been granulated in order to increase permeability to gas flow during the calcining operation, to enhance the efficiency of heat exchange in the rotary kiln, and to reduce the amount of dust escaping with the products of combustion. These problems are common to many calcining and sintering processes. The granulation of materials in such processes was carried out originally in rotary drums, but recently the inclined pan, also known as the granulating bowl, plate granulator, tilted pan, or "Flying Saucer," has been used and is claimed to have operating advantages over the drums (7).

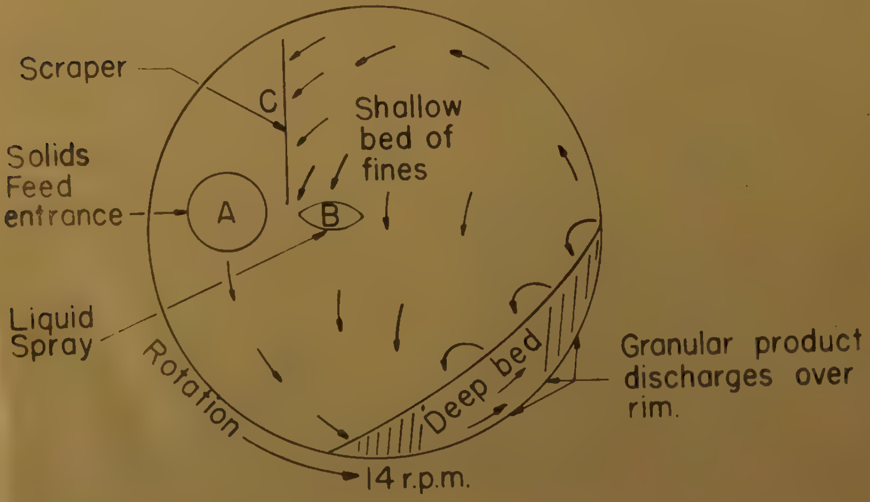
There are several modifications of the inclined pan (*1, 5*) but a typical unit (Figure 2) is 12 feet in diameter, 14 inches deep, and has a straight side wall at right angle to the floor. It rotates counter-clockwise at a speed of 14 r.p.m. and is usually adjustable to inclinations of 30 to 50 degrees from the horizontal. The only internal parts are stationary scrapers for keeping the pan clean. Figure 3 is a diagram illustrating the action of the inclined pan on the material being granulated. In a typical type of operation on superphosphate or premixed fertilizers, the powdered solid is fed into the rotating pan at point "A" from overhead at constant rate. The plasticizing agent, usually water, is sprayed (point "B") on the material in the pan at a sufficient rate to cause agglomeration of the fines, which are being deflected under the spray by scraper C. In theory, the inclined pan is a particle size classifier owing to its segregating action on the material being granulated. The larger particles migrate to the surface of the deep bed at the lower side of the pan and are discharged over the rim while the finer particles remain in the pan for further agglomeration until they are of sufficient size to be discharged as granular product. There is a cascading action in the deep bed of material at the low side of the pan, and a rolling action in the shallow bed of fines as they are carried beyond the 12 o'clock position into the path of scraper C on the high side of the pan.

When the finely-divided initial material has satisfactory agglomerating properties, the rolling action on the shallow bed of wetted fines forms exceptionally well-rounded granules in the same fashion as when a thin layer of similar material is passed through a rotary cylinder. The product obtained with operation of the pan on such materials is said to be very uniform within the particle size range of 1 to 4 mm. (approximately 5-16 mesh). However, the operation and production rate of the machine depends on the agglomerating characteristics of the material being granulated. Fertilizers having poor agglomerating properties, such as those that yield a high proportion of recycle fines when granulated in rotary cylinders, require the addition of plasticizing agents other than water when the granulation is carried out in the inclined pan (2). Water glass and bentonite are examples of plasticizers that have been used for this purpose (*8*). Some modifications of the pan include a baffle situated a few inches inside the outer rim which forms a channel at the periphery in which the product can be treated continuously with coating agents (*1, 8*).

Fertilizer Granulation

ABOUT 7 years ago, the West German Associates of Delo (Engineers) Ltd., London, England, are reported to have developed the Loesche inclined pan (*2*) for granulating superphosphate and mixed fertilizers. The pan gained considerable commercial use for granulating fertilizers in West Germany. Similar units of various sizes have been used either for commercial production or experimentation in Africa, Australia, Brazil, Chile, Canada (*1*), France, Greece, Italy, New Zealand, Norway, Portugal, Switzerland, and elsewhere (*2*). Reppert (*9*) in Germany used an inclined pan for acidulating finely-divided phosphate rock with either sulfuric or phosphoric acid and granulating the product superphosphate in one operation. For example, ground phosphate rock was fed continuously to the central area of the pan and sprayed with phosphoric acid containing 43% P_2O_5 at a rate sufficient to form triple superphosphate. As the granular product flowed over a baffle into the channel at the periphery of the pan, it received a 2% coating of rock dust which facilitated solidification of the granules before leaving the pan and curing of the product in storage. Granulated mixed fertilizer was also made continuously in the same equipment (*8*) by spraying the mixture with aqueous ammonia.

Figure 3. Diagram showing action of the rotating inclined pan.



Considerable industrial research has been carried out in Australia (*10*) on the use of the inclined pan for granulating superphosphate to the extent of reducing the dust content of the product used for top dressing or direct application. While the pan gives variable results, owing to small differences in the character of the superphosphate feed, it is still being used to produce a coarse grade of superphosphate for direct application. In this operation run-of-pile superphosphate, is passed over a 3/16-inch screen and the fines are fed to the pan. A water spray is directed on the fine material leaving the scraper as indicated in Figure 3. The larger particles leave the pan with little or no wetting and no size enlargement, while the fines receive most of the water added. Thus, the moisture required for granulation, depending on the fines content, is 2 to 3% less than that required for granulating the same material in a rotary cylinder. This illustrates the classifying or segregating action of the inclined pan which is highly desirable in granulating individual materials but less desirable with mixtures in which homogeneity in nutrient

(*Continued on Page* 98)

INVENTORY CONTROL
for the
AGRICULTURAL CHEMICAL FORMULATOR

by E. S. Heckathorn and R. J. Cardinale

United-Heckathorn
Richmond, California

(Conclusion of a two-part article)

Percentage of Value: Practically all formulators control the maximum investment in inventories by general classes of raw material or finished product. All companies interviewed seem to do this whether or not they put a strong emphasis on inventory turnover.

To put dollar limits on the hundreds of items in inventory is extremely cumbersome; so this system is seldom used for finished goods. By practical experience, management sets limits or controls only on the major items; usually the active ingredient raw materials. In analysis of raw material inventory, it was found that 10 to 15 items accounted for 85% of dollars. One company had 60% of dollars in only 7 items. A report to management by stock control on such a few items is effective and an inexpensive control and, probably, the most widely used management control.

The other 15% of raw material inventory dollars included diluents, minor active ingredients, emulsifiers, solvents, containers, etc. Other systems of control are generally used for this class of product; usually, automatic replenishment at lowest volume cost on low priced items to smallest purchase possible on high priced items. Management generally reviews this part in inventory once or twice a year.

Management's tight control of raw material inventory in this industry makes good sense. Since most formulating plants have been built for the peak seasonable load, and production time is so short, most of the customers' demands can be met, providing the active ingredients are readily available.

Consignment inventory from raw material manufacturers has been very helpful to the formulator; however, to be a true saving, it is very wise to analyze periodically the cost to both the formulator and the manufacturer. In one case, other charges, except investment and taxes, exceeded $10,000 to the consignee. Consigned stock should be evaluated as to its worth. Unfortunately, consigned stock is not all free; approximately 4% of value is a cost to the consignee. To be fair with a supplier, care of his inventory and turnover of consignment should be handled in the same way as the formulator's own inventory.

Dollar and Time Limits: Percentage of value is not too effective for finished goods, or any inventory of many items. Dollars and time limit systems are most commonly used; limiting the maximum quantity of any item within a specified time interval, usually a season of use; e.g., 5-50% Dust, minimum 150 tons @ X dollars, June through September; balance of year, 50 tons @ X dollars. As a control device, dollar and time limits are extremely flexible and can be altered by changing the reordering pattern.

Time limits may be used independently of dollar limits; but, generally, they should be used together for a complete control. Time limits are usually extensions or variations of the dollar limits. Time limits usually have a minimum quantity below which the stock position of any one item should not fall. Time and dollar limits control the frequency and quantity of reorder. Reorder is always a factor of required production lead time and advantages of quantity production and purchasing. Here nomographs and linear charts are extremely helpful.

Time and dollar limits are extremely good control for finished goods on consignment. Consignment inventories in customers' warehouses vary from 5 to 30% of the formulator's total inventory; average being about 15%. The formulator, by setting the time and dollar limits at any one location, has an adequate control. One company permitted a consigned stock equal to average monthly sales. Another used a 50% factor; 50% of average monthly sales allowed in inventory. Only one company had the old policy of anticipating a year's requirements and making one shipment; considering freight and storage costs being more important than inventory dollars.

Before deciding on a usable policy, it is good to first chart sales and inventory dollars by months and see how well they follow the same pattern. A suggested chart is shown in Figure #5. Further breakdown by geographical areas may be helpful, combining those areas that have the same season.

Physical Inventory: It seems that most companies restrict a physical count of inventory to once a year for audit purposes only, rather than using this excellent technique as an inventory control. Some companies use a quarterly inventory count with a special report to management. One company uses a monthly physical on both raw materials and finished goods.

During the active season, raw material inventory, as we have discussed, can be controlled by a visual or an obligation system set up on cards that can be kept fairly accurate; with plant managers actually counting the 10 to 15 items that are necessary to have in stock. But the inventory control of finished goods, particularly in consignment locations, by physical count is a very good technique often overlooked by management. There are many advantages of a monthly physical inventory:

1. Most perpetual inventory systems develop errors through carelessness and mistakes in paper work. These can be corrected with a physical count.
2. The loss of products through shipments that have not been adequately recorded can be caught within the memory span of the individual handling them.
3. Inspection of stock in consignment is necessary and this forces someone to review stock and its condition at least once a month.
4. These calls on consignees can be used as sales calls, particularly with the idea of replenishing stock that has been depleted.
5. This may be used as a basis of billing to the customer rather than waiting until the audit time or the customer's appraisal of his sales.
6. It forces completion of all paper work.

There are many disadvantages, of course, to this type of control. It is expensive and;

1. Requires the use of sales or field personnel rather than accounting personnel.
2. There is a tendency of sales people to be somewhat inaccurate.
3. Since it is not actually required for accounting purposes, it is often considered unimportant by accounting and not given their proper supervision.

Forecasting: Due to the vicissitudes of insects and weather, forecasting has generally been considered inaccurate and unreliable for use in inventory planning. However, this does not mean forecasting cannot be used, and certain phases can certainly be helpful in planning of inventory for the formulator.

The normal indexes for economic forecasting; such as Bureau of Labor Statistics, Farm Income and Business Cycles certainly are little or no help as, so far, no one has developed any correlation between these conditions and the formulator's business.

The most prevalent means of sales forecasting are as follows:

1. Salesmen's estimates by territories, with the "hope" element removed.
2. Past history.
3. Estimates of crop acreage.

This system is a fairly reliable estimate of the dollars to be spent by the farmer for pest control; usually within 5-10% of the estimate, unless there is an insect or weather catastrophe. No one, however, claims any accuracy as to what product will be used.

Forecasting of actual product to be used is not dependent upon economic factors, such as farm or consumer income; but more a technical forecast of what insecticides will be cleared for use under the Miller Act. Forecasts, therefore, must be evaluated by technical people as to the control measure to be used on a particular crop, and weighed against the acreage planted. This is particularly true of concentrated farming areas with row and tree crops. No one wants to venture forecasts on certain areas, such as the Cotton South, regardless of published data on acreage.

Government programs, such as those for the control of the pink bollworm, Mediterranean Fruit Fly, etc., can completely upset estimates.

Forecasting, with the use of history of an area, is on the increase. The industry, with 12 years of experience now in the organic field, is gradually developing a sane, sensible "feel" of the market. With data on use of materials gradually being accumulated by U. S. Department of Agriculture and States; forecasting could become an integral part of inventory control. By tabulating data by localized areas, there seems to be a pattern developing which formulators can build upon for future forecasting.

Most competent forecasting started from acreage planted, average pest and weather problems, insecticides cleared for use, history of area, and that altogether important "feel" of the local skilled man.

The number of items and cost of an inventory requires adequate

(*Continued on Page* 98)

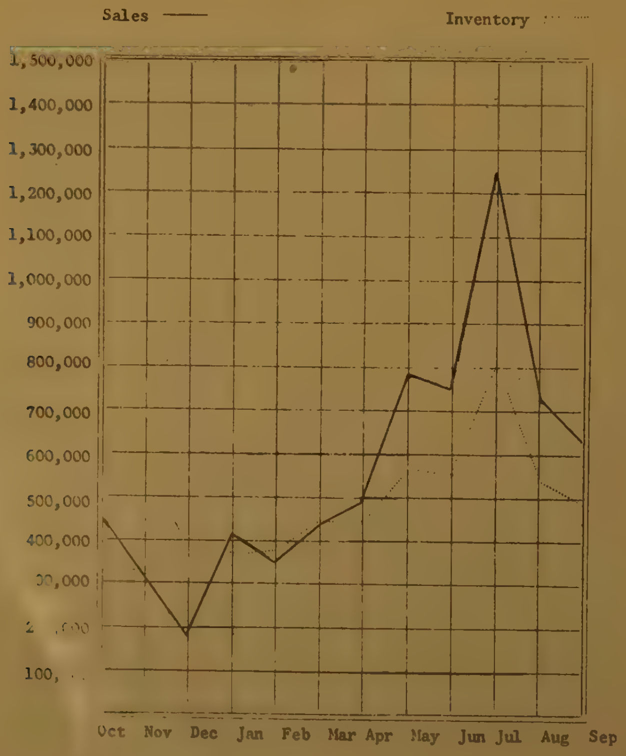


Figure 5. Line graph depicting direct relationship of inventory to sales as a method of planning inventory control.

Sales, MH-30, Recommendations Highlight C-VPFA Discussions

A DISCUSSION on the use of maleic hydrazide for tobacco sucker control, in which representatives of the experiment stations, cigarette manufacturers, and the producers of maleic hydrazide were heard, was a feature of the annual meeting of the Carolinas-Virginia Pesticide Formulators Association at the Carolina Hotel, Pinehurst, N. C., Nov. 30 to Dec. 2.

J. M. Moseley, assistant to the vice president, American Tobacco Co., Richmond, Va., said that the quality of tobacco is important to his company which must cater to its customers' desires. Cigarette and cigar manufacturers, he pointed out, must be very careful in the selection of tobacco to maintain their high standards. We find, he said, that maleic hydrazide exerts a profound effect on tobacco which results in a poorer quality cigarette.

The chemical makeup of the leaf, Mr. Moseley said, is altered in the direction of greater portions of carbohydrates through the use of maleic hydrazide by growers and this results in a product that does not have good storage characteristics. The use of maleic hydrazide on the eastern North Carolina tobacco crop during 1958, he said, is believed to have been a major cause for the undesirable tobacco produced. Mr. Moseley said, however, that, in 1959 tests, the undesirable effects of MH were lessened with later applications and reduced rates.

Until more is known about the action of maleic hydrazide, Mr. Moseley recommended that the product be withdrawn from the market by its manufacturer.

Dr. Roy R. Bennett, agronomy extension specialist (tobacco), N. C. State Experiment Station, Raleigh, reported on experiments with MH that are being conducted by the experiment station. He said there were some adverse effects on flavor and aroma resulting from the use of MH and the problem is to determine the extent to which these differences are important.

Color slides of tobacco plots shown by Dr. Bennett indicated that, as far as color, body, and texture are concerned, it is difficult to tell whether tobacco has been treated with MH or not. That is not to say, however, he warned, that there are not some chemical differences. He said that there are no data as yet on chemical analysis and, at this time, the North Carolina experiment station does not recommend the use of maleic hydrazide on tobacco. Research, he said, should be carried out jointly among the chemical manufacturer, the experiment stations, and the cigarette manufacturers to arrive at a positive answer to the problem.

Dr. H. D. Tate, director of agricultural chemical research, Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn., producer of MH-30, said that maleic hydrazide first was tested on tobacco in 1945 and, since that time, has been worked with by experiment personnel both in the U. S. and abroad. The conclusion reached in these studies, he said, was that MH-30, when properly used, is a good product.

Maleic hydrazide, he said, is something the farmer badly needs. The present labor situation, Dr. Tate reported, leads some growers to say that if there is no chemical means available next year, they will not be able to sucker or top their tobacco plants at all.

Three major points covered by Dr. Tate in his remarks about maleic hydrazide were: sucker control, its effect on chemical properties of tobacco, and its effect on physical properties. MH-30, he said, does a good job of controlling suckers, when properly used.

MH-30 does affect chemical properties, he said, but no more than do other factors such as fertilizers and irrigation. Used properly, Dr. Tate declared, MH-30 will produce leaves that do not differ greatly from hand-suckered tobacco in appearance and texture.

The basic problem of the tobacco industry, Dr. Tate concluded, is its emphasis on quantity as opposed to quality. This, he said, results in poor growing practices, such as planting too close and fertilizing too much. MH-30 is a scapegoat and its elimination would not solve any problems, he said. The solution to the problem offered by Dr. Tate was that farmers be educated to follow more closely all label directions and recommendations.

John C. Curtis, extension marketing, N.C. State College, Raleigh, spoke on "The Sale: Bringing the Product and Customer Together." He said that a sale is never really closed until the consumer has made a profit from the product. He said that salesmen must clearly distinguish between needs and wants on the part of their customers and must change a need to a want in order to get action.

A discussion of soil and grain insecticides was presented by Dr. Walter M. Kulash, professor of entomology, N. C. State. He said that storage bins in North Carolina are not ideal for fumigation. In most of them, he said, the fumigants are not effective for more than two days. The method of application, he continued, is important in grain fumigation. Where the fumigant is applied all over the grain, it has a much greater effect than when it is applied only in the center.

Referring to soil insect control, Dr. Kulash said that there is only one really effective way of controlling soil insects. That is a thorough study of the problem in each field before planting, because no two fields present the same problem. The most effective soil insecticides, according to Dr. Kulash, are Aldrin and Heptachlor, applied as a dust or spray at two pounds per acre. Before treatment, he said, the soil should be prepared as if for planting.

Clayton Bartley, Geigy Chemical Corp., Ardsley, N. Y., reported on Simazine and Atrazine as crop herbicides. Simazine, he said, now is registered for use on corn and strawberries in the Northwest and research indicates that it controls a wide range of annual, broad leaved and grassy weeds in pre-emergence application.

The only crop for which Atrazine now is registered is corn, for pre-emergence weed control, Mr. Bartley said. Atrazine can be applied up to three weeks after a pre-emergence herbicide normally would be applied, he said. During the coming season, he concluded, Simazine and Atrazine will be offered as 80 per cent wettable powders and granular formulations containing four per cent active ingredients.

The differences in price competition and non-price competition were discussed by C. E. Bishop, head of the department of agricultural economics at N. C. State. He said that when one company adopts something like guaranteed sales it may make a profit but when all companies adopt it, costs probably will increase.

Factors, he said, to be considered before engaging in price or non-price competition are, what are the added costs and what benefits can be expected? It is easier, Mr. Bishop said, to predict costs than gains.

George Simches, vice president of the Planters Chemical Corp., Norfolk, Va., appeared on a panel discussion of marketing activities and called for the elimination, by the manufacturers of basic chemicals, of the practice of selling these chemicals on consignment to formulators. By doing so, he said, the manufacturers will set in motion a movement that, in the years ahead, will help insure that the formulators still will be customers of the manufacturers.

Kenneth Blanchard, Carter Insecticide Co., Wallace, N. C., was elected president of the C-VPFA for 1960 to succeed Frank Reid, Quality Chemical Co., Wilson, N. C.

John Thompson, Graham Chemical Co., Greensboro, N. C., and O. E. Herring, Daly Herring Co., Kinston, N. C., were named vice presidents; and J. C. Whitehurst, J. C. Whitehurst Co., Greenville, N. C., was elected secretary-treasurer.

Looking at the chemical industry as a whole, Mr. Simches said that, since 1950, it has been growing by leaps and bounds—six per cent per year, and at the same time has been spending $600 million yearly on research. Pesticides, he reminded, are a vital segment of the chemical industry.

Mr. Simches spoke of the glowing prospects for future growth of the pesticide industry but warned that some of the present marketing practices are unsound. Consignment, or guaranteed sale, he said, is a fallacious system which has no merit whatsoever when scrutinized honestly in the light of good sound business management. To remedy this, he said, the aid of the manufacturers of basic chemicals must be enlisted. Let the manufacturer of basic chemicals show an unselfish interest in this far-reaching problem by stretching out a helping hand, he said.

Let them ship, he said, these chemicals on business-like terms. Formulators, he said, in turn, will be confronted with the bare facts of business life. No more working on the other fellow's capital.

Mr. Simches said that if the basic manufacturers of the commodities will eliminate consignment of their products, within several years, all of the formulators will have, by necessity of captial outlay and the enforced realization of good business principles, discontinued unhealthy marketing policies.

Dr. W. J. Mistric, entomologist, North Carolina State College, Raleigh, presented the 1960 insect control and recommendations for the cotton areas of North and South Carolina and Virginia. He reminded the audience of the program followed three years ago which was based on the degree of infestation and was a hit or miss program. Applications, he said, were put on as needed.

The 1960 program, Dr. Mistric said, takes into consideration the degree of infestation. He said that the 1960 program is, in a sense, preventative and involves continuous applications at regular intervals. It is based on an individual field concept, dealing with the overall population of boll weevils. The object, he said, is to prevent oviposition by over-wintered weevils.

An all-out effort of control of weevil beginning just prior to squaring, he said, and continuing just beyond squaring, is planned. The first spray would be about June 8 and the other two would follow at five day intervals. It would not be necessary, Dr. Mistric said, to re-enter the test fields anymore until immigration, which occurs in the Carolinas-Virginia area about Aug. 1.

No solution to the weevil problem exists at present, he said, but there is hope that some material will be available in the future to deal with the survivors of a control program. Two reasons for this hope, Dr. Mistric concluded, are the superior materials now being produced and the reduced parent populations following a preventive program.★★

Officers of the Entomological Society of America: M. P. Jones, USDA, who assumed presidency at the close of the 1959 meeting; P. W. Oman, USDA, retiring president; and H. H. Harris, Iowa State U., president elect.

"Insecticide Future Is Firm"—States Hall at Annual ESA Meeting

"DESPITE the many pressures exerted against pesticides, I believe that insecticides and the principles of using them in agriculture are as well established and, at least as important as the use of chemical fertilizers," stated S. A. Hall, ARS, USDA, in addressing the meeting of the Entomological Society of America held November 29-December 1st at the Sheraton-Cadillac Hotel in Detroit. "Insecticides, moreover, are so well established in their vital and unique role of controlling and eradicating important insect vectors of disease that we can feel assured that no pressure—even that exerted by vociferous opponents of insecticides—will seriously inhibit their use against disease vectors," continued Dr. Hall.

"As for biological control methods—as we know them today—I do not believe that they will take over in place of insecticides. In fact, some biological control methods may very well work best when geared together with a carefully calculated use of the most suitable insecticide.

"We shall need tailor-made insecticides that only more research can bring forth and develop. And these we shall need for a long time ahead. Thus, I see insecticides maintaining their position of great usefulness under the harsh selection pressure to which they are exerted."

Dr. Hall appeared as a guest speaker at the chemical control sessions of the meeting of entomologists, which this year combined the meeting of the Entomological Society of Canada and the Entomological Society of Ontario with the Entomological Society of America. Dr. Hall's report on the "survival of insecticides" reviewed the various pressures and tests to which pesticides are subjected, recalling some well known commercial products, and giving some of the reasons they are no longer in use. Paris Green, for example, a "king" of insecticides some six or eight decades ago, was hopelessly outclassed by DDT and other present-day synthetics. Calcium arsenate, which has had a brief resurrection in recent years, mainly because of resistance of cotton insects to the chlorinated hydrocarbons, is again declining because its performance is not good enough.

HCN declined under the selection pressures of resistance and warm-blooded toxicity. Nicotine used for so many years, is no longer produced in the U. S., but is imported. It is apparently losing the battle of survival against the pressure of superior performance of organic phosphorus synthetics. Rotenone is falling off for somewhat the same reasons. It has not been involved in residue problems, but this is not equivalent to saying that it will always get off Scot free in this respect.

p-Dichlorobenzene, while still widely sold and used against clothes moths and carpet beetles, can be expected to decline because of more effective materials, such as lindane, and clothing impregnation by DDT, dieldrin and other agents. Isodrin, which is a stereoisomer of aldrin has dropped out, presumably because it showed no great advantages over aldrin, was more costly, and had a higher warm-blooded toxicity.

Dr. Hall mentioned many more well known chemicals which have lost ground in very recent years. "Aramite," he said, "is a very effective acaricide with a very favorable acute warm-blooded toxicity, but long-term chronic studies revealed this to be carcinogenic, so that a zero tolerance was decreed as far as residues are concerned. This could be fatal to its survival," he observed.

"There was much interest in TEPP a decade ago, because it was so effective against aphids and mites. But TEPP declined in use because of replacement by more effective compounds, parathion being the first. TEPP has a very unfavorable acute warm-blooded toxicity, but it is free from the selection pressures of residues and of cost. Because TEPP hydrolyzes rapidly, there are no residues under normal conditions of use, and it is one of the cheapest of the organic phosphorus compounds to produce as a technical grade material."

—And to continue, Dimefox was the first of Schrader's organic phosphorus insecticides. It was replaced rather early in the game by the superior performance of schradan, and schradan in turn has been replaced largely in the United States by demeton (or Systox) because of its superior residual properties, broader insect spectrum, etc. In England, however, schradan is preferred in some quarters because of its selectivity and relative freedom from killing off useful predatory insects. EPN has had its rise as a close competitor of parathion, but it is more costly and has thus declined. Chlorthion, another close relative of parathion, was dropped presumably because its use was not broad enough to justify its cost of production.

The above are just some of the commercial chemicals Dr. Hall cited in his address. He also observed that many more products did not survive laboratory screening tests and preliminary field tests . . . never even reaching the commercial market. The biggest stumbling block of an experimental material going from laboratory tests to field tests, observed Dr. Hall is performance . . . performance in competition with other materials on the market. "A lot of money and much of the time and effort of entomologists could be saved by putting more effort into better laboratory screening methods, which more nearly simulate conditions encountered in later field trials of an experimental material." It would be most difficult to compile a list of these laboratory failures, said Dr. Hall, since much of this information is buried in confidential files and may never become openly available for study.

"I will just mention one other class of chlorinated hydrocarbons which are particularly effective for the control of grasshopper outbreaks. Their performance is so excellent at dosages of only 2-3 ounces of active ingredient per acre, and the cost so low as to make it practical for operations covering several million acres. But these materials—aldrin, dieldrin, heptachlor—are presently coming under the increasingly important selection pressure of residue problems. All of the chlorinated hydrocarbons, regardless of their toxicity, or their lack of toxicity, to warm-blooded animals are under pressure when they get into milk—and all of them do. Every insecticide has a zero tolerance in milk and this situation, in my opinion, is unlikely to change.

"Ultimately, however, I believe, that the insecticide which will come out on top will be at least as effective as the one it displaces, and also cheap enough for the use involved, but free of residue problems. This is a challenge to insecticide chemists and producers to come up with the practical answers."

Taxonomy Vs Applied Biology

IN his presidential address, P. W. Oman, retiring president of ESA, discussed the relation of insect taxonomy to applied biology and observed that "if taxonomy is to be of maximum usefulness to applied biology, it must continue to be creative. It cannot rest on whatever laurels it has, and concern itself solely with the application of existing knowledge.

"Progress in science depends on related specialties moving forward, more or less in unison. If you doubt that taxonomy and applied biology must go hand-in-hand, I suggest you recall the confusion introduced into the study of the biology of the primary screw-worm, because of failure to differentiate between the primary and secondary screw-worm flies, or the unsuccessful search in South America for the beet-leafhopper when it was actually to be found in the Old World."

Dr. Oman urged that some means be developed to retrieve scientific information lost in files, and avoid much of the repetition of research.

Answering the question, "How are we doing on insect control recommendations?," H. B. Petty, Univ. of Illinois, told his audience that the situation is not much different than it was fifteen years ago. "Farmers," he said, "are not willing to practice cultural and preventive pest control because it costs time, labor and money." They probably won't use cultural controls unless this can be incorporated into regular farm practices.

Citing some weaknesses in insect control recommendations, Dr. Petty listed the following: a) lack of cultural control — including sanitation and preventive maintenance; b) improper application of chemicals; c) poor timing; d) poor application equipment; e) careless and indiscriminate use of insecticides; f) chemical residues; and g) confusion in the mind of farmers on what to use and when.

Elaborating on some of the above points, Dr. Petty reminded his audience that in making recommendations and suggestions, they should keep in mind that they are dealing with the *individual farmer*,—that as such, specificity is important. For each pest, the extension entomologist can probably recommend several insecticides, — He should however remember that such a recommendation can and does create confusion in the mind of the farmer on what should be used.

In connection with application equipment, Dr. Petty indicated that equipment should not be put on the market until it has been tested for the specific use for which it is being sold. A granule corn borer applicator put out had not been adequately tested for this use, with the result that a number of complaints resulted this year on this method of application. In previous years, said Dr. Petty, low gallonage sprayers were rushed on the market before work on this equipment was completed.

Dr. Petty also observed that the industry has failed to take full advantage of the press and other communications media to ease the consumer's mind on use of pesticides,—and concluded his remarks, observing that the farmer of the future to be efficient, will have to use more insect control measures.

(More on the 1959 ESA Meeting in January "Agricultural Chemicals")

Resistance is Discussed at Oregon Horticultural Meeting

by Loren H. Milliman

INSECTS will continue to plague farmers unless all the latter in an area were to agree on use of a given pesticide for a year, then would switch to another chemical of an entirely different structure the following season. Dr. Leon C. Terriere, who made the suggestion, admitted it was impractical, but said it would help eliminate insect resistance to pesticides.

This was one of many ideas presented to more than 1000 persons gathered on the Oregon State College campus Nov. 19 and 20 for the 74th annual meeting of the Oregon State Horticultural Society. A four-ply session, which divided into sub-sections, covered topics of special interest to apple and pear orchardists, stone fruit producers, small fruit growers, and vegetable raisers, respectively.

Extremely detailed work in chemical analysis needed to detect residues was made more understandable by Dr. Terriere who said that some of the tests were equivalent to finding an ounce of insecticide in 500 tons of apples or pears.

Captan shows much promise in controlling storage rots when used in wash tanks on the package lines, C. F. Pierson, USDA plant pathologist stationed at Wenatchee, Wash., told the growers. Phaltan has many of the advantages and characteristics of Captan, but tolerance has been established for it.

If mold spores were as big as footballs, growers would do something about controlling them, Mr. Pierson commented in conclusion.

New chemicals being used by orchardists get the blame for anything unusual appearing on the trees or fruit during the season, F. E. Ellertson, Oregon State college experiment station entomologist, pointed out in a panel discussion of spray materials for 1960 for apples and pears.

Sevin was blamed for russetting on Anjou pears in the Hood river valley, when investigation disclosed that it was lime-sulfur which had been applied too late for that variety planted in a block of Bartlett pears. There was some original burning of leaves in the Bartletts that was ascribed to use of Sevin, but Ellertson said it was of no consequence.

On the other hand, any combination of Sevin and oil produced severe injury and all tests with those mixtures were stopped.

An unusual heat wave which followed application of Trithion was blamed for considerable defoliation and some fruit drop in Bartletts in the Medford area, Dr. Louis G. Gentner, entomologist at the experiment station there, told the group. It was the first time this had happened when Trithion was used.

Temperatures ranged between 100 and 106 for 15 days after the chemical had been used in the third cover spray, Dr. Gentner explained.

In forecasts for the coming season's spray program in Oregon's two major apple and pear-producing regions, Ellertson and Gentner agreed that it would be very much the same as for 1959.

Dangers of toxicity to sensitive crops from relatively high levels of boron applied in the previous year have perhaps been over-emphasized in the Willamette valley, H. J. Mack, Oregon State college assistant horticulturist, reported to vegetable growers. Boron deficiency has been noted in the past, and various methods of application have been tried to correct the matter.

As much as 10 pounds of boron per acre have been applied for table beets and broccoli, but apparently not enough of the element remained in the root zone of crops planted the next year to cause damage.

Chemical weed control was a major topic for discussion in several meetings. As a result of the cranberry catastrophe, growers were particularly conscious of residues and asked many questions concerning use of various weed killers. It was stated unequivocally that if aminotriazole was used according to directions around non-bearing trees in the nursery row or in the orchard a year or more before the trees produced fruit, there would be no danger of residue.

Growers were warned not to use any weed-killers around bearing trees unless those chemicals had been given an official clearance by the U. S. Food and Drug Administration. Because of variations in soil, climate and moisture conditions in different parts of the state, producers were advised to try the herbicides on a limited basis at first.

Those weed-killers which are soluble in water could offer more problems to orchardists because rain and irrigation would wash them down into the root zone, it was pointed out. On the other hand, chemicals insoluble in water could accumulate in quantities that could be harmful.

Trees, among many plants, have the ability to break down weed-killers into other substances. Under certain conditions there could be harmful results, it was suggested.

Aminotriazole at the rate of 8 pounds per acre combined with Karmex DW at 4 pounds per acre, sprayed so weeds and grass around non-bearing trees were thoroughly wet, did a good job in weed control. A low-pressure sprayer should be used, and care exercised to keep the chemicals from the tree foliage.

Wild morning glory was not controlled, and (strangely) orchard grass which had been planted as a cover crop was more difficult to check than was quack grass.

Use of X-77 or Tween 20 with the chemical increased the effectiveness of aminotriazole greatly, it was pointed out. The cost of the weed treatment was about 5¢ or 10¢ a tree, depending on whether one or two applications were made in a season, it was estimated.

"There is good promise in the use of chemicals as weed-killers, despite the recent set-back," declared Virgil H. Freed, Oregon State College agricultural chemist. Damage to trees from use of the various weed-killers could build up, although symptoms at first would not be visible, he cautioned in urging orchardists to follow recommendations of extension agents, fieldmen and experiment station workers.

Karmex and Simazin will not damage trees when used at the rates recommended, he pointed out. In addition, heavier soils provide a margin of safety for the orchardist. (Conversely, those whose orchards are on lighter soils must be more careful in using herbicides.)

One chemical group which has shown promise in the weed-killing category is a bad actor from the residue standpoint, Freed continued. This is the benzoic series because it is particularly stable in the soil.

The fact that there apparently are four gibberellins has complicated research with this plant growth regulator, Dr. S. B. Apple, Jr., head of the department of horticulture at Oregon State College, told the vegetable growers.

Vegetable seed production is an important specialty, and use of gibberellin to substitute for dormancy, or to produce earlier flowering has been under test. Gibberellic acid A_4 reportedly is about 100 times more active than is A_3 on cucumbers, for example.

Quaternary ammonium compounds also have received considerable attention in recent months as plant growth regulators. Their action is the opposite of gibberellin in that they tend to check elongation without noticeable distortion of the leaves. Amo 1618 (one of these materials) in effect made bush beans of Blue Lake pole beans, the principal processing variety grown in the area.

Growth regulators have also been tested on beans to prevent blossom drop, but Dr. Apple explained that effects on yield were not significant, and that first the cause of the drop should be discovered before effective use can be made of the materials for this purpose.

Symphylids still rank as the worst pest of vegetable crops in the Pacific Northwest, according to Angus J. Howitt, entomologist at the Western Washington Experiment Station, Puyallup. The 1959 season in Washington was one of the worst on record, he told the convention.

Residual soil insecticides, particularly the chlorinated hydrocarbons, are generally ineffective. In addition, the erratic behavior of the pest including its irregular distribution pattern and unpredictable feeding habits make evaluation of compounds under field conditions very difficult.

Under carefully controlled conditions, Howitt tested various fumigants on the pests and decided that 1,3-dichloropropene was most effective. Telone produced from 95% to 100% kill in 14 to 30 days after the fumigation in mineral soils, while DD was 50% to 60% effective. Chloropicrin, Vapam, ethylene dibromide, and Nemagon were found to be ineffective against the garden symphilid in the tests Howitt conducted.

All fumigants were ineffective in fine textured clay and in soils high in organic matter, he added. When used as a broadcast treatment at 20 to 40 gallons per acre, Telone gave effective control for the season. Cabbage yields in treated plots were two to three times greater than in untreated ones. However, control did not extend beyond one season.

Symphilids destroyed crops in 1959 in fields that had been successfully treated with Telone at 30 gallons to the acre in 1958. Fumigation was not considered practical unless the grower had a return of $4 for every $1 spent in fumigation, Howitt continued.

Dimethyl disulfide, which had shown considerable promise in field tests last year, failed to control symphylids attacking newly-sprouted corn this year when it was applied at the rate of 30 gallons per acre as a side dressing treatment.

Chlorinated hydrocarbons, except for lindane, had little effect on the pest. Of 46 compounds tested, only parathion, USC 8305, V-C 13, American Cyanamid E. N. 18133 gave outstanding results and appeared to be the most promising of the insecticides tested in special laboratory trials, Howitt declared..

In field trials, E. N. 18133 again looked very good in the tests, while V-C 13 at 15 pounds to the acre looked very promising and in certain cases gave excellent results at 7½ pounds to the acre.

Cyclamen mites that have caused much damage in California strawberry fields, have appeared on plants in Oregon, so extensive tests have been made to find means of control, Dr. R. G. Rosenstiel, Oregon State College entomologist, told the small fruit growers. Methyl bromide fumigation at the rate of three pounds per 1000 cubic feet of space at 70° F. will control the mite, but it also injures non-dormant plants.

Endrin at the rate of a gallon to 100 gallons of water or Thiodan at the rate of one quart of emulsion to the 100 provided an effective dip in which young plants were immersed just before planting. No injury to the plants was observed, according to Dr. Rosenstiel. In fact, there seemed to be increased plant survival and growth compared with check plants.★★

SYSTEMIC INSECTICIDES

for the control of Gasterophilus Bots in horses

by R. O. Drummond, J. B. Jackson, E. E. Gless, B. Moore
Entomology Research Division,
Agr. Res. Serv., U. S. D. A.

IN the United States, horses are commonly parasitized by three species of bots, *Gasterophilus nasalis* (L.) (throat bot fly), *G. intestinalis* (DeG.) (horse bot fly), and *G. haemorrhoidalis* (L.) (nose bot fly). Early means of controlling these pests were nose and throat protectors to prevent egg deposition (Dove 1918) and washes of warm water and other solutions to stimulate premature hatching of larvae (Knipling and Wells 1935). In addition, oral treatments with carbon disulfide destroy the larvae inside horses (Bishopp and Dove 1926), but require professional skill for administration. Oral treatments of toluene were found highly effective against *intestinalis*, but less effective against *nasalis* (Todd *et al.* 1950, Todd and Brown 1952, Sinclair and Enzie 1953). Graham and Alford (1951) conducted *in vitro* and *in vivo* tests with certain chlorinated hydrocarbon insecticides and parathion, but found none to be effective against *intestinalis* and *nasalis*. After research was completed by the present authors, the work of Bolle (1957) was brought to our attention. He found solutions of Dipterex to be active against horse bots in the laboratory, and also reported excellent control of *intestinalis* in horses by oral treatments of 30-40 mg./kg.

Within recent years, several organic-phosphorus compounds have been found to be active as animal systemic insecticides. Most of them have been tested for the control of grubs (*Hypoderma* spp.) in cattle, and oral toxicity to several species of livestock has been determined (Radeleff *et al.* 1955, Radeleff and Woodard 1957). Several were used in tests to determine effectiveness against horse bots. These tests were conducted at Kerrville, Texas, in February through May 1959.

Methods. — Forty-eight horses in groups of six from a slaughter house in San Antonio, Texas, were brought to Kerrville for treatment. Most of the horses were in good to fair physical condition. The horses were weighed and held under dry-lot conditions in separate pens. Usually feed was withheld for 24 hours before treatment.

Insecticides were administered by three methods. For initial tests, all compounds were administered through a stomach tube. Formulated material was suspended or dissolved in water, and technical material was dissolved in water or in a mixture of alcohol and water. In later tests, DDVP and Dipterex (*O,O*-dimethyl 2,2,2-trichloro-1-hydroxyethylphosphonate) were added to the feed. Dipterex, technical or a 50% soluble powder, was dissolved in water, and technical DDVP in a mixture of alcohol and water. Doses of each insecticide were mixed with two quarts of a commercially mixed horse and mule feed which consisted of crimped whole oats; corn and milo chops; cane molasses; wheat bran; alfalfa-leaf, cottonseed, and linseed meal; pulverized oyster shell; and salt. One horse was treated by adding technical Dipterex to feed without dissolving the insecticide in water. The third method was by intramuscular injection; one horse was treated with a 40% Dipterex solution in diethyl succinate.

Horses treated with a stomach tube or intramuscularly were fed alfalfa hay within two hours. Those treated with insecticide in feed were not given additional food until the contaminated feed was consumed. Manure from each horse was collected for 1 day before and daily for 1 week after treatment and the numbers, instars, and species of expelled bots were recorded. On the evening of the seventh day the horses were taken to San Antonio for slaughter. Entire gastro-intestinal tracts were returned to Kerrville for examination. On the next day, these organs were opened and a record of live and dead bots, by species and instar, was obtained from each general area of the stomach and intestine.

Many of the larvae removed from feces were motile and appeared normal. To determine mortality or ability to pupate, all bots expelled from horses treated with several insecticides on May 13 were removed from feces and kept in glass jars or vials at room temperatures.

Results. — Both second- and third-instar larvae of *intestinalis* and *nasalis* were collected from the feces or gastro-intestinal tracts, but no *haemorrhoidalis* larvae were found. In previous studies, Graham and Alford (1951) had found only the first two species in horses from this locality.

Results of tests with insecticides administered with a stomach tube are summarized in table 1. Co-Ral (*O*-(3-chloro-4-methylumbelliferone) *O,O*-diethyl thiophosphate, also known as Bayer 21/199), Dowco 105 (*O*-(4-*tert*-butylchlorophenyl) *O*-methyl ethylphosphoramidothioate), ronnel (Trolene grade), and dimethoate failed to control bots in initial tests. Dowco 109 (*0*-(4-*tert*-butyl-2-chlorophenyl) *0*-methyl methylphosphoramidothioate), Ruelene (4-*tert*-butyl-2-chlorophenyl) methyl methylphosphoramidate), DDVP and Dipterex were very effective at one or more dosages, and subsequent dosages were reduced until failure to control was obtained.

In feed Dipterex was 100 per cent effective at 75 and 100 and DDVP at 25 and 50 mg./kg., but both failed at 10 mg./kg.

When injected, Dipterex was only partially effective against both species.

As shown in table 2, most of the larvae expelled during the first three days were alive but very few pupated.

Of the 48 horses treated, only six showed symptoms of toxicity due to the insecticides. However, practically all the animals showed wholeblood cholinesterase depression.* The animal given Co-Ral at 25 mg./kg. by stomach tube was the most severely affected. One given Dipterex at 100 mg./kg., two DDVP at 50 and 25 mg./kg., and two Ruelene at 100 and 50 mg./kg. were also affected, the last one only mildly. All animals poisoned by Co-Ral, Dipterex, and DDVP showed muscular weakness, marked abdominal pain (colic), hypermotility of the intestine, and diarrhea. The typical symptoms of phosphorus-insecticide poisoning in cattle, sheep, and goats — salivation, dyspnea, and stiff-legged walk — were not evident. However, the horse treated with Ruelene at 100 mg./kg. showed marked salivation, diarrhea, and dyspnea in addition to colic.

Ronnel, Dowco 109, dimethoate, Dowco 105, and Ruelene at 25 mg./kg., Dipterex at 75 mg./kg. and lower in feed and via stomach tube, and DDVP at 10 mg./kg. via stomach tube and 50 mg./kg. in feed caused no toxic symptoms.

The results of tests with three horses do not appear in table 1. One was infested with only a single bot, one had a sand impaction in the caecum and failed to pass bots, and one, offered Dipterex in feed at 100 mg./kg., failed to consume the contaminated feed. The feed offered this horse was very moist because of the large amount of liquid used to dissolve the Dipterex and was further wet by rain.

The horses showed some reluctance to eat feed contaminated with Dipterex at dosages of 50 mg./kg. or greater. Most horses consumed the feed within 6 hours, but several took 24 or more hours. At lower dosages the feed was consumed in a short time. One horse consumed feed contaminated with dry Dipterex in less than an hour.

Discussion. — There were no obvious differences in susceptibility between species of bots, although Dipterex seemed slightly more effective against *nasalis* than *intestinalis*. In feed, Dipterex as a 50% soluble powder was as effective as the technical material.

The partial effectiveness of the intramuscular treatment indicated that Dipterex acted systemically against the bots. Since the compound undoubtedly was in contact with the bots when administered by stomach tube or in feed, the activity may be twofold, systemic and contact.

Both Dipterex and DDVP were more effective when administered in feed than by stomach tube. Studies with labeled Dipterex in cattle (Robbins *et al.* 1956) have shown that the compound is rapidly degraded and excreted. Since consumption of feed involved more time than stomach-tube treatment, toxic levels may have been maintained for longer periods and differences reflected in effectiveness of the treatments.

Horses treated with Dipterex passed a large number of intestinal helminths, but numbers and identification of the species were outside the scope of this investigation. Dipterex has been reported to be effective against several internal parasites of cattle (Riek and Keith 1958). Possibly one treatment administered for bot control will also reduce the number of helminths.

Of the four compounds that removed bots, the effective dosages of two, Ruelene and DDVP, were also toxic. Larvicidal dosages of Dowco 109 were only slightly higher than ineffective dosages. Dipterex, highly effective in feed at 25-75 mg./kg., was toxic only at 100 mg./kg. when administered by stomach tube.

Because of an apparent adequate margin of safety between

— Summary —

To determine effectiveness of 8 systemic insecticides against Gasterophilus nasalis **(L.) and** intestinalis **(De G.), horses were treated with a stomach tube, by adding insecticides to feed, or by intramuscular injection. The numbers of bots expelled in manure were compared with the numbers remaining in the gastro-intestinal tract. Co-Ral, Dowco 105, ronnel (Trolene grade), and dimethoate failed to expel bots. Dowco 109 by stomach tube was partially effective. Ruelené was effective at 100 mg./kg., DDVP at 50 mg./kg. by stomach tube and at 50 and 25 mg./kg. in feed, and Dipterex at 100 and 75 mg./kg. by stomach tube and 75-25 mg./kg. in feed. Ruelené and DDVP by stomach tube were toxic to the horses at effective dosages. Dipterex was toxic at 100 mg./kg. by stomach tube, but nontoxic at lower dosages by stomach tube and in feed. With Dipterex, treatments in feed were more effective than those by stomach tube; no differences in susceptibility of the two species of bots were noted. Dipterex injected intramuscularly at 25 mg./kg. was partially effective against both species. Dipterex in feed at 37.5-40 mg./kg. appeared to be a safe and practical treatment for control of both species of horse bots.**

Chemical names of insecticides are as follows: Co-Ral (0-(3-chloro-4-methylumbelliferone)0,0-diethyl thiophosphate), also known as Bayer 21/199, Dowco 105 (0-(4-tert-butylchlorophenyl) 0-methyl ethylphosphoramidothioate), Dowco 109 (0-(4-tert-butyl-2-chlorophenyl)0-methyl methylphosphoramidothioate), Ruelene (4-tert-butyl-2-chlorophenyl) methyl methylphosphoramidate), and Dipterex (0,0-dimethyl 2,2,2-trichloro-1-hydroxyethylphosphonate).

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*Cholinesterase data analyzed by J. B. Jackson, L. M. Hunt. R. O. Drummond, and W. B. Buck, all of the Kerrville, Tex., laboratory.

the toxic and effective levels, Dipterex in feed at 37.5-40 mg./kg. appears to be a practical treatment for horse bots. However, before it can be recommended for general use, more field experience with larger numbers of horses is necessary. Effectiveness against *haemorrhoidalis*, the timing of treatments for most efficient control of all species, and safety for horses of different breeds and ages held under various conditions should be established before widespread use is undertaken.★★

TABLE 1

Numbers of *Gastrophilus* bots expelled from and present in horses after administration of systemic insecticides. (One horse per treatment).

Insecticide	Dosage (Mg./kg.)	G. intestinalis Second Instar Expelled	G. intestinalis Second Instar Present	G. intestinalis Third Instar Expelled	G. intestinalis Third Instar Present	G. nasalis Third Instar Expelled	G. nasalis Third Instar Present
Stomach Tube							
Co-Ral (25% WP)	25	9	0	11	203	0	73
Dimethoate (technical)	50	2	0	33	50	0	0
	25	1	11	1	120	3	5
Dowco 105 (25% WP)	100	5	7	2	30	0	1
Ronnel (25% WP)	110	2	12	0	69	0	4
Dowco 109 (25% WP)	100	2	0	144	0	45	0
	100	0	0	32	6	1	0
	75	0	0	34	4	9	1
	50	0	0	39	12	9	5
	25	1	0	0	22	1	1
	10	0	3	0	20	0	20
Ruelene (25% WP)	100[1]	0	0	0	0	17	0
	75	0	0	4	168	5	0
	50	0	0	89	61	9	2
	25	0	5	2	63	2	41
Dipterex (50% soluble powder)	100	29	0	430	0	7	0
	75	10	0	52	0	63	0
		12	0	137	0	26	0
	50	10	0	189	38	2	0
	25	0	0	19	5	0	0
	10	7	3	16	59	6	0
DDVP (technical)	50[2]	4	0	28	0	51	0
	25	2	0	101	191	52	0
	10	0	0	4	93	4	8
In Feed							
DDVP (technical)	50	0	0	70	1	2	0
	25	1	0	16	0	0	0
	10	0	0	31	15	3	11
Dipterex 50% soluble powder	100[3]	0	0	20	0	24	0
	75	0	0	45	0	0	0
	75[4]	6	0	134	0	7	0
	50	12	0	149	2	26	0
	50[5]	6	0	68	1	58	0
	50	3	0	44	0	56	0
	37.5	1	0	3	0	0	0
	25	0	0	33	0	0	0
Technical	50	0	0	23	0	8	0
		1	0	86	0	1	0
		0	0	53	2	0	0
	25	1	0	54	6	0	0
	25[6]	5	0	125	14	19	0
	25	0	0	21	0	0	0
	10	2	1	13	243	1	0
		0	0	2	83	1	11
		0	0	22	39	5	75
Intramuscular Injection							
Dipterex (40% in diethyl succinate)	25	0	1	56	51	15	1

[1] 2 second-instar *nasalis* expelled.
[2] 1 second instar *nasalis* expelled.
[3] 50 mg./kg. for two consecutive days.
[4] 37.5 mg. kg. twice on same day.
[5] 25 mg kg. twice on same day.
[6] Dry Material.

TABLE 2

Survival, pupation, and adult emergence of bots expelled from six horses treated on May 13 (2 bots before treatment, both of which emerged as adults).

Days	Number of Bots Expelled	Number of Bots Alive	Number of Bots Pupated	Number of Adults Emerged
1	12	12	1	0
2	137	85	1	1
3	84	62	0	–
4	41	17	0	–
5	30	11	0	–
6	9	2	0	–
7	6	2	2	1

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(Continued on Page 100)

W. Thompson Elected President of Florida Horticultural Society

Seated — new president W. L. Thompson (left), and retiring president S. John Lynch.
Standing — treasurer R. R. Reed (left), and secretary E. L. Spencer.

OVER 700 persons registered at the October 27-29 convention of the Florida State Horticultural Society at the Hotel Everglades, Miami, Florida. During this 72nd annual meeting of experts in a wide variety of horticultural subjects, over 100 papers were presented in sessions of five sections of the Society, namely Citrus, Vegetable, Ornamental, Processing, and Krome Memorial which covers unusual tropical fruits.

In the Citrus Section, Dale W. Kretchman, Citrus Experiment Station, Lake Alfred, reported that field trials with chemical herbicides for the control of perennial grasses in groves revealed that Dowpon, at two pounds an acre with two to four days intervals, gives appreciable control of Bermuda grass and maidencane for six months, and of paragrass and guinea grass for three months. Little or no injury to trees eight years old or older was observed in repeated applications at this rate.

G. K. Rasmussen and P. F. Smith, USDA, Orlando, added rock phosphate to subsoil to give 200, 500 and 2500 ppm phosphorous for experiments in greenhouse tests of orange seedlings. The rock phosphate had no effect on growth and no influence on the pH of the subsoil. Acid phosphates were found to be toxic only in the water phase, with toxicity being removed when acidity is removed.

The effect of lead arsenate sprays on deadwood, yield, fruit size, and fruit drop of Marsh grapefruit was reported by E. J. Descyzk and S. V. Ting, Citrus Experiment Station, Lake Alfred. This experiment was conducted for nine seasons using sprays at the rate of .4, 1.25, and 3.0 pounds per hundred gallons. These sprays reduced the dropping of immature fruit, the amount of deadwood, and the final yield contained less small sized fruit.

W. L. Thompson, J. R. King, and P. J. Jutras, Citrus Experiment Station, Lake Alfred, described an air spray attachment designed at the Experiment Station to improve spray coverage. Experiments indicate that these air spray directing attachments improve distribution of sprays sufficiently to warrant further investigation.

Mr. Thompson also reported on leaf drop following spray applications on citrus. It was found that regardless of type of spray used, leaf drop was more severe when the spray was applied while a natural leaf drop was in progress. Mixtures of oil with zineb or basic copper sulfate did not cause more drop than oil alone, but lime-sulphur mixed with fungicidal copper compounds caused a significant amount of leaf drop.

In the Vegetable Section, R. M. Baranowski, Sub-Tropical Experiment Station, Homestead, discussed systemics for control of the serpentine leaf miner, a tomato pest.

A carbon formulation of Thimet applied to tomato seeds was found to be the most effective of three insecticides tested. When applied at the rate of 2.4 pounds per acre; the control from this treatment was comparable to the 5% granular at 6.8 pounds per acre. Twenty-one days following the Thimet treatment, only 6% of the tomato plants were infested with leaf miners as compared to 100% of untreated plants. A second experiment designed to determine the effectiveness of Thimet when combined with fertilizer showed essentially the same results.

Di-Syston also provided some control, but Phosphamidon which gives good control when used as a foliar spray was not effective as a systemic. The differences in amount of worm-injured tomatoes and stink bug-injured tomatoes, though not statistically significant, did suggest a certain amount of protection from these pests.

Experiments reported by Mr. Baranowski showed that DDT when combined with Diazinon or Parathion resulted in less control of the leaf miner than the use of Diazinon or Parathion alone. Where ½ pound of Diazinon had given 73% control, the addition of DDT reduced the control to 39%. Control by Parathion was less effective, and the addition of DDT reduced that to nothing.

Diazinon alone, although not as lethal as Diazinon plus DDT, was believed to give better results because even though the Diazinon killed many of the parasites of the leaf miners, it has little residual action, thereby allowing adult parasites to move in and parasitize the leaf miner larvae.

Baranowski's experiments brought the conclusion that the idea of preventive application is a commendable one and in some cases the only possible method of spraying, because it is easier and more dependable to tell someone to spray on a regular schedule rather than only when necessary. However, when the insect situation is such that different insecticides are necessary to control the various pests, the application of a combination of insecticides is highly questionable, particularly if DDT is one of the materials. It is more economical from the standpoint of insecticide used and value derived to use an insecticide for worms on tomatoes only when necessary rather than routinely.

D. S. Burgin, assistant horticulturist, Gulf Coast Experiment Station, Bradenton, reported on three seasons experiments with herbicides for control of weeds in tomatoes and pole beans. Eptam at the rate of four pounds per acre as a layby treatment was said to give excellent control on seedling broadleaf weeds and grasses. Good results were also reported in control of tomato fields with both Eptam and Diuron. No reductions in crop yields were noted.

E. N. McCubbin, Potato Investigations Laboratory, Hastings, found that DNBP, CDEC, and PCP gave 40 to 86 per cent control of weeds in potato fields. DNBP was most effective when application was delayed until just before the potato plants emerged. DNBP and PCP were effective on weeds whether applied before emergence or up to one to two inches tall, but CDEC needed to be applied before weeds were growing. Potato yields were not affected by these herbicides.

C. B. Hall, Agricultural Experiment Station, Gainesville, spoke to the Vegetable Section and also to the Processing Section on celery experiments. He said that, in general, Florida grown celery has a higher potassium content and is lower in sodium, nitrogen and sugar content than the California grown celery.

Mr. Hall added that flavors are affected by the type of fertilizer used, and the growth stage at time of application. A high sodium fertilizer was said to be effective in reducing bitterness.

The Ornamental Section included a number of discussions on growth and disease control of cut flowers and ornamental shrubs.

Thimet reported best control for leaf miner on tomatoes. In another report, — users are cautioned on indiscriminate application of "combination pesticides" involving DDT.

Jasper N. Joiner, University of Florida, reported on the timing of applications of nitrogen, phosphorous, and potassium on pot grown chrysanthemums. Many of the schedules followed by commercial growers in applying fertilizer were shown to be wasteful in labor and materials. Some growers fertilize as often as every day, and others twice weekly to every two weeks. Mr. Joiner's experiments with applications of nitrogen at 7, 21, and 35 day intervals definitely showed that applications at 7 and 21 days were superior to other treatments, including the three-time frequency.

Most growers also add potassium at frequent intervals on the assumption that it leaches out and requires constant replacement. Data from this experiment indicated that potassium is not as leachable as thought previously, or else the plant can store sufficient potassium during early stages of growth to last throughout the flowering period. Nitrogen and potassium applied at 7 and 21 days produced better results than when applied at more frequent intervals. Experiments even showed that where potassium, phosphorous and nitrogen were mixed into the potting soil, adding nitrogen once in 7 days, that this was as good or better than applying two or three times during the growing period.

In determining the results, the flower size, the number of flowers, stem length, and stem diameter were considered.

W. L. Thompson, Lake Alfred, was elected new president of the Society, succeeding S. John Lynch, of Osprey. R. R. Reed, of Tampa, will serve as treasurer; and E. L. Spencer, Bradenton, was re-elected secretary.

Vice-presidents elected for each section are: Citrus — Henry C. Whitesell, Largo; Vegetable — George M. Talbott, Orlando; Ornamental — J. H. Popham, Fort Lauderdale; Processing — Charles H. Brokaw, Orlando; and Krome Memorial — F. Gray Butcher, Miami.★★

Fertilizer attracts

PRODUCTION and processing of pulverized and semi-granular fertilizers were featured in discussions at the 1959 Fertilizer Industry Round Table, held November 4-6 at the Mayfair Hotel, Washington, D. C. Some 416 representatives of industry and the government attended the three-day sessions, which included reports on the mechanics of formulation calculations, statistical quality control, preneutralization, equipment for semi-granulation, and a review of problems of conventional fertilizers.

Plant Processes at CIL

L. V. Clegg, production manager of Canadian Industries, Ltd., discussed operations, management and the organization set up at Canadian Industries, which has some 25 plants including 7 fertilizer plants throughout Canada. All fertilizer plants for the firm, reported Mr. Clegg, use the same process and raw materials. The production department has several functions: order raw materials and schedule shipment; control formulation; supervise process improvements; select and train staff. Record keeping is probably one of the most significant jobs in the production department, advised Mr. Clegg, pointing out that comparisons are made on figures at the seven plants.

E. Doidge, works manager at CIL reported to the Fertilizer Industry Round Table on design of CIL granulating plants recently installed in Hamilton, Ingersall and Chatham, Canada.

The three continuous granulation plants constructed in 1957 for CIL were designed after a study of a number of plants operating in the United States, and after analysis of the multiple problems faced. CIL bought the "Ober Phos" process developed in 1926 by Gustaf Ober & Co., Baltimore, (which was later incorporated into Davison Div., W. R. Grace Co.). The process has incorporated for over 30 years, remarked Mr. Doidge, the basic flow mechanisms of the so-called TVA cone mixer, —the difference being that in the Ober process, the mixing action is carried out at elevated pressures, and at much higher flow rates (on the order of some 300 tons/hour during the charging cycle).

In overall design, observed Mr. Doidge, the aim was for a quality product which could be produced with a lower labor content in a plant in which minimum maintenance cost would be experienced, and from which no air pollution would result. It was concluded that to ensure non-caking properties in the granulated product, the dried granular fertilizer should have a moisture content from .5% to 1.0% moisture. The product should be sized between 6 and 14 mesh, ie 1 to 3 mm; with no more than 10% of the bagged product finer than 14 mesh.

One problem confronting CIL engineers was that of granulating substantial tonnages of 0, 2%, and 3% nitrogen grades. The decision was finally made to install a TVA type rotary ammoniator, rather than the double or single shaft pug mill. The reasons for this selection were stated as: high repair costs and high power input required for the pug mill without corresponding increases in efficiency of granulation. They were also influenced in their choice of a separate ammoniator and granulator by the operating difficulties seen at plants operating a combined unit.

Re: Dryer and Cooler Units

Mr. Doidge remarked following inspection of granulation at many of the plants visited, it seemed clear that the drier is a limiting factor in plant output. Thus in CIL plans to make low nitrogen grades, requiring a high moisture content to produce granulating conditions, the dryer was constructed with an 8-foot diameter, 60-foot length, slope of 3/8-inches to the foot, retention time of 28 minuates. Maximum heat input is rated at 25 million BTU/hour, but thus far, said Mr. Doidge, actual input has been only 18 million BTU when granulating 30 tons--hour. Air flow through the dryer is 40,000 cfm.

The cooler shell is the same size as the dryer, with the same air flow rate. In actual experience, the flow rate has been found to be greater than required to cool the

Top photo: "How Much" Marshall, Round Table treasurer and "Della" (Ginny Hush) at the registration desk.
Lower Photo: Dorr-Oliver model of a granulation plant and a phosphoric acid plant, exhibited at the Round Table meeting. Behind the exhibit are: H. Pratt and Richard L. Kulp, who described the unit.

First installment of "Agricultural Chemicals'" report on the Round Table Meeting.

Fertilizer Round Table Executive Committee: A. Spillman, Fertilizer Manufacturing Cooperative; James Reynolds, Jr., Davison Chemical Co.; chairman, Vincent Sauchelli; and secretary-treasurer, H. L. Marshall, Olin-Mathieson Chemical Corp.

Industry Round Table 416 at 8th Annual Meeting

fertilizer down to 100° F., and CIL has reduced the air flow through the cooler to a maximum of 20,000 cfm during the hot weather, and to a minimum of 5000 cfm when temperatures get below 0°.

Re: Fume Control, Scrubbers

In an analysis of fume control, Mr. Doidge indicated the problem is twofold: (1) the recovery of fumes, which were defined as submicron particles, largely ammonium chloride; and (2) removal of entrained dust particles either of ungranulated materials or particles in the dryer & cooler. High efficiency cyclones can be expected to remove particles larger than 5 microns,—but for smaller sized particles, removal was noted as a somewhat more involved problem. The accompanying chart was presented, on which selection of the equipment was based:

In addition to economy the bag filters were found to have the added advantage of recovery of all entrained solids, including ammonium chloride fumes.

	Dry Fan 3 cycl.	Wet Scrubber Fan & 3 cycl.	Dry Bag Filter	Venturi 3 cycl.
Capital Cost	$31,900	55,000	102,300	185,500
Oper. Cost	$1,925	2,880	2,880	6,250
(power)	100hp	150hp	150hp	325hp
Interest at 6%	1,815	3,330	6,150	11,150
Dust loss 700 tons @ $45	31,500	28,350	3,150	28,350
		10% recovery as slurry	90% recovery as fines	10% recovery as slurry
Bag replacement			5,000	
Depreciation 10%	3,190	5,550	10,230	18,150
Total Annual Cost	38,430	40,110	27,410	64,300

Mr. Doidge reported that recycle fines in the CIL operations consist of dust recovered in three 24-foot high, 6-foot diameter cyclones on each of the dryer and cooler units,—and of the -14-mesh material passing the bottom of the screening equipment.

Current investigations of dust losses from the cooler stacks seem to indicate that a large amount of fine dust is produced in the cooler caused by cascading action of the fertilizer granules. In sampling the cooler stack on a 10-10-10, which gives quite hard granules, dust loading of 1.25 grains/ft^3 is found in exit gas after passing through the cyclones. At the reduced air flow of 20,000 ft^3/min, this produced a dust loss to atmosphere of almost 1-ton/8-hour-shift. The plan to cope with this problem is to recycle cooler exhaust air to the dryer, since the bag filters will remove any fume by introducing fine dust into combustion chamber.

Mr. Doidge reported that at some plants that were visited, operators were observed to make frequent manual adjustments to acid solutions valves, as the bed appeared a little too wet or dry. It seemed clear, that the process in these plants was still very much at the mercy of the operators. CIL, he said, has installed automatic indicating recording, and controlled liquid metering equipment, to avoid just this situation.

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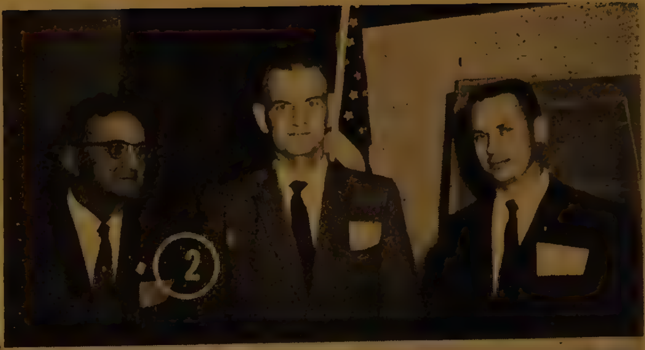

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Semi-Granulation of Fertilizer

A discussion on "semi-granular" fertilizers, the general advantages and limitations was presented by Elmer Perrine, Nitrogen Division, Allied Chemical Corp. "Semi-granulation is one of the developments at a respectable intermediate level between good pulverized and good granulated fertilizer", observed Mr. Perrine. "If anything is unique in semi-granulaton, it is the realization that perfection of product in this field may be too costly for some operators, combined with the realization that some popular grades are fairly easy to granulate at an acceptable level below perfection".

This type production, continued Mr. Perrine, has its place among operators who wish to produce limited tonnage of grades that are easily granulated with better storage and handling qualities than in much of the ordinary pulverized fertilizer,—and those willing to take some calculated risks, since moisture and temperature are not under complete control. These operators must be willing, if necessary, to cease operations of this system in hot weather. Semi-granulation is a favored method for those who do not see sufficient tonnage soon to justify going all-out with full scale granulation to very nearly overcome all of their condition troubles. About 40 plants distributed widely over the fertilizer producing areas are now engaged in this practice, and within limitations, they are giving satisfaction.

PHOTO CAPTIONS

(1) Standing: J. Prosser, A. J. Sackett & Sons; W. Tucker, GLF; E. Kapusta, U. S. Potash Co.; Seated: J. Countess, Baugh & Sons; W. King, W. S. Tyler Co., and R. Smith, Eastern States Farmers Exchange.
(2) H. L. Fader, Fertilizer Mfg. Corp.; W. W. Harwood, I.M.C.; R. E. Robinson, Atlanta Utility Works.
(3) W. J. Strauss, Foxboro Company; G. C. Marburger, Spencer Chemical Co.; Chester McCall, Booz-Allen Research.
(4) Dale Kieffer, Smith Douglass Co.; E. Doidge, Canadian Industries, Canada; W. Cuming, Commonwealth Fertilizer, Australia.
(5) T. R. Schmalz, F. S. Royster Company; H. H. Tucker, Sohio; J. Hardesty, USDA; G. R. Gilliam, Allied Chemical Corp.
(6) E. Leister, Edw. Renneburg; A. Malone, Central Farmers; N. K. Alfrey, Davison Chemical Co.
(7) F. Niellson, IMC; T. J. Bosman, Federal Chemical Co.; E. Perrine, Allied Chemical Co.
(8) Ray Yates, Ashkraft Wilkinson Co.; R. Stone, Miller Chemical Corp.; Page Morris, duVal Sulphur & Potash Co.; S. H. Stone, Miller Chemical Corp.
(9) H. Bailey, Moores Lime Co.; A. Henderson, Wilson Toomer & Co.; M. Rowe, Ashkraft Wilkinson Co.
(10) J. Sackett (left) and Walter Sackett, A. J. Sackett & Sons at their exhibit.

Describing the semi-granulation process, Mr. Perrine pointed out that this could well be termed "minimum equipment granulation." It requires merely that sulfuric acid be added to the mix—usually in a conventional rotary batch mixer—through a separate distributor pipe, about duplicating the design of a good ammoniating distributor pipe. The flights of the mixer should preferably, though not necessarily, be reduced in depth to about 12 inches in the one-ton, and to 14-inches in the two-ton mixers. Refinements of worth are the use of meters, replacing measuring tanks. Means should be provided for channelling off the considerable fumes sometimes released.

The cost of the minimum equipment for semi-granulation is very low, primarily because no equipment is provided for drying or cooling. As a result, a very important difference in the products is the fact that much semi-granulated fertilizer is stored at, and sometimes above the maximum water and heat content acceptable in full-scale granulating plants. Because of the high temperature of the product when made, there is considerable heat loss enroute to storage from the evaporation of some moisture and from radiation. When there is much drop through the air, this cooling may be considerable. Most operators find it necessary to recirculate the product through the system at least once, sometimes more, within one or two days, to reach a reasonable level of moisture for storage.

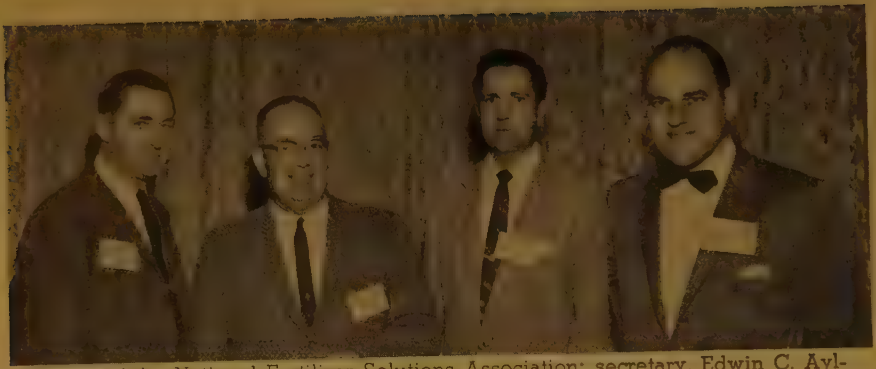
Economic considerations in any system justify crowding it to the maximum of its several features; moisture and temperature in storage are the first to suffer, unless getting granulation at all be the major problem in overcrowding.

Semi-granulation and full granulation can hardly be thought of as competitive, observed Mr. Perrine. Semi-granulation must select a few favorable formulas, it is limited by the weather and tonnage requirements. Because the ability of semi-granulating plants to remove water is severely limited, it is almost mandatory that they use superphosphates, nitrogen solutions, acid and even any filler of the lowest water content, sometimes at increased costs. Since all of the forming of the particles is usually to be done in the mixer batch-wise, with only one try within a narrow period of time, the skill of the operator largely supplants any influence that continuous, automatic operations may have, such as continuous ammoniating, drying, cooling, and recycle.

Mr. Perrine reported that good results in nitrogen retention and product quality were obtained through the following procedures in semi-granulating 8-16-16. All of the nitrogen was supplied by a solution containing 29.7% NH_3, 64.5% ammonium nitrate, and only 5.8% water, one of the driest solutions. This supplied 100 pounds of ammonia which, when reacted, generates about the minimum amount of heat which many operators believe is required for good semi-granulation. Enough 66° Be sulfuric acid was used (90 pounds) to produce at least 200° F temperature exit the mixer. This, reported Mr. Perrine, was only the amount of acid required to neutralize the ammonia, thereby holding the costs of ingredients to a low level . . . a thing not always practical in every system. About one-quarter of the nitrogen solution was applied to the mixture of all dry materials through its separate distributor pipe, followed by the acid, and then by the balance of the nitrogen solution.

(*Continued in January*)

Bright Future Seen for



Officers of the National Fertilizer Solutions Association: secretary, Edwin C. Aylward, Aylco Fertilizer Co.; president, H. S. Surles, Planters Cotton Oil & Fertilizer Co.; vice president, D. R. McHard, Kaw Fertilizer Service; and treasurer, Edward A. Wex, Badgerland Liquid Fertilizer Corp.

THE National Fertilizer Solutions Association held its 1959 convention at the Statler-Hilton in St. Louis, November 8-10, with a record attendance of 475 representing practically every state.

In a discussion of Solutions and Suspensions, W. S. Newsom, Jr., Research Engineering & Development division, of International Minerals & Chemicals Corp., Mulberry, Fla., predicted that suspension fertilizers will capture 5% of the total fertilizer market in the near future. "I expect 20 plants to be making suspension fertilizer by next spring, and 20 more making the lower suspension fertilizers." He added: "I don't think, however, that they will ever completely replace liquid fertilizers."

In reviewing the clay dispersion technique, Mr. Newsom explained that good dispersion of clay is the key to the production of high-quality suspension fertilizers. He said that at IMC two attempts in pilot plant operations and two in plant operations were made to disperse the clay by recirculating through centrifugal pumps, with the discharge throttled down. Each time the results were unsatisfactory. As a note of encouragement, however, he added: "I don't mean to say that it cannot be done, but it just is not practical."

panel discussion entitled: These Are the Facts," was conducted by J. E. Tuning of Spencer Chemical Co., who spoke on Nitrogen; James L. Brown, Monsanto Chemical Co., on Phosphates; and Dr. Edwin C. Kapusta, United States Borax & Chemical Corp., on Potash.

Mr. Tuning poined out that in spite of temporary shortages in nitrogen solutions last spring, the tonnage growth shows "we have a bear by the tail." He estimated that an increase for 1959 may be as much as 100,000 tons.

In forecasting a bright outlook in 1960 for nitrogen, he said it should be a good year tonnage wise, and that usage will take another jump. Additional storage has been or is in process of being provided at plant sites and additional loading facilities are being provided.

He pointed out that dealers can help by unloading tank cars fast and returning them to the supplier. "The maintenance of tank cars is costly, and hoarding of tank cars at dealer's place of business results in lower tonnage moved." Summing up, he said: "We expect an increased demand for nitrogen solutions and we have the capacity to supply it."

James L. Brown in his talk on Phosphates said, "The demand at the season's peak was larger than the supply and this is one reason there was a shortage." He pointed out that fertilizer manufacturers can do a lot to help eliminate shortages, though expansion of storage facilities might take a year to three years. "I believe if you consult with your supplier and estimate your needs more closely and increase your storage capacity, you can go a long way to overcome your problems," said Mr. Brown.

Dr. Kapusta said "The only shortage the potash people had last year was a shortage of customers." In attempting to forecast future supply, he said he thought potash supply and demand may be in much closer relation than in recent years. The fertilizer manufacturer should plan and schedule the ordering of his raw materials for his needs. Raw material storage facilities at fertilizer plants are inadequate, he believes, and serious consideration should be given to additional storage facilities.

A Town Hall Meeting or "A rollup shirt sleeves session" drew many questions from members. Moderator of the panel "What's Bothering You?" was Robert A. Lemhler. Participants were: Edward C. Aylward; L. T. Stone; Edward A. Wex; Morris Woosley; E. E. Crouse and Carl Johnson. All are liquid fertilizer manufacturers.

Panel member Ed Wex said he had heard of a type of storage with a polyethylene liner.

Panelist Woolsey was asked to tell from his experience what use of super phosphoric acid could do to help solve problems in liquid fertilizer formulation. Among advantages, he said super phosphoric acid stores successfully and over a long period of time. Under disadvantages he said the biggest one is its lack of availability and the high freight rate.

SUSPENSION FERTILIZERS

National Fertilizers Solutions Association Attracts Over 400 at St. Louis Meeting, Nov. 8-10

Many of the questions from the floor dealt with the pros and cons of custom application of liquid fertilizers. One panelist replied that 95% of the solutions they market are custom applied. Another replied that as long as they could finance the operation they would rather control their own application equipment. Other members suggested that the farm equipment people such as John Deere and International should be invited to future conventions to participate actively. "The responsibility on the part of the liquid fertilizer manufacturer is to get the farmer to buy machinery . . . to buy the liquid attachments to be used on the farmer's own machinery . . . and when he (the fertilizer manufacturer) does this he also helps the machinery dealer sell this machinery."

From the Central Illinois area, where there are said to be six or eight liquid fertilizer manufacturers, a representative said: "We have promoted custom application for ourselves and we know that we can do a better job than the farmer can. We knew of instances where a competitor gave the farmer equipment, but he didn't do a good job, because he didn't know how."

A question relating to the development of inhibitors was answered by Mr. Brown of Monsanto who said his company now has an inhibitor in field trials. It will take at least six or eight months before the results of tests will be available. If practical, such a product will minimize storage costs.

Carl Johnson of Cropmaker Soil Service, Walton, Indiana spoke to the group on how to plan an adequate, successful advertising campaign.

His report along with one made by Ed Crouse of C. D. Liquid Fertilizer Corp., Liberty, Ind., on How to Make Farm Meetings Successful," aroused much favorable comment.

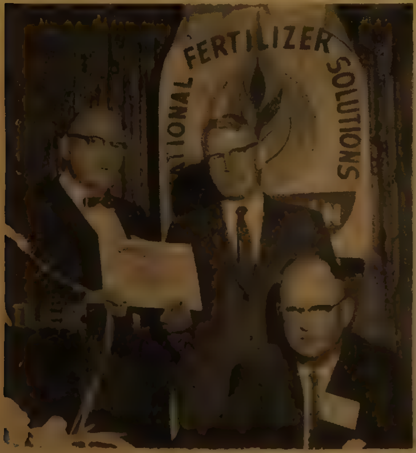
One of the highlights of the convention was the conference rooms in which suppliers, dealers and others associated with the industry displayed their products, literature, greeted visitors, and extended hospitality. There were 36 such conference rooms this year, an increase over the 23 last year.

The 1960 convention will be held in Memphis at the Peabody Hotel, November 9, 10, 11, 1960.

Officers elected to serve during 1960 are: Hugh S. Surles, Jr., Planters Cotton Oil & Fertilizer Co., Rocky Mount, N. C., president; Dean R. McHard, Kaw Fertilizer Service, Lawrence, Kan., vice president; Edward A. Wex, Badgerland Liquid Fertilizer Corp., Milwaukee, treasurer; Edwin Aylward, Aylco Fertilizer Co., Sullivan, Ill., secretary. Miss Muriel F. Collie, Chicago, is executive secretary.

New board members elected at the convention are: Paul C. Hughes, Farmer's Soybean, Blytheville, Ark; L. T. Stone, Goodpasture Grain & Milling Co., Brownfield, Tex; Rhotan Cross, Farmer's Elevator; Edward O'Man, Land-O-Man Warehouse; Clyde Gilna, Norco Chemical Co., Denver; H. H. Tucker, Sohio Chemical Co., Lima, Ohio; Edward C. Aylward, Aylco Fertilizer Co., Sullivan, Ill; and Robert W. West.

The man of the Year award was presented to W. Harold Schelm, Schelm Bros. Inc., East Peoria.★★



W. Harold Schelm, Schelm Bros. receives man-of-year award from William B. Parrish, of the NFSA board of directors. Seated is O. L. Ohnstad, Ohio Liquid Fertilizer Co., retiring president of the association.

The photo at right shows the board of directors.

Maleic Hydrazide Discussed By Panel at Canadian Meeting

A PANEL discussion on the use of maleic hydrazide for sucker control on tobacco plants was held at the annual meeting of the Canadian Agricultural Chemicals Association in Quebec City, Sept. 20 to 24. Appearing on the panel were two men in favor of its use and two who had opposed it. Those in favor felt that maleic hydrazide, properly used, need not affect tobacco any more than other practices, such as fertilization and irrigation can cause variations in the flavor and appearance of tobacco. Those opposed seemed to feel that additional experimental work is called for before maleic hydrazide can be recommended for use on tobacco.

The undesirable effects of maleic hydrazide on tobacco are so serious that its use is not to be recommended, in the opinion of Leo C. LaPorte, Imperial Tobacco Co. of Canada, Ltd., Montreal. Research, he said, indicates that the use of maleic hydrazide as a sucker control has certain undesirable effects on the chemical and physical properties of the tobacco leaf.

It is true, he said, that some cultural practices such as over-irrigation, over-fertilization, and excessive use of insecticides can cause deleterious effects in tobacco of similar magnitude to those caused by maleic hydrazide, but for the good of growers, manufacturers, and consumers all such malpractices should be, and are, discouraged. Mr. LaPorte claimed that the use of this chemical by Canadian tobacco growers will at once decrease the attractiveness of the crop and, hence, reduce its competitive position in the world's markets.

From the manufacturer's point of view, he continued, a reduction in filling power decreases very considerably the value of the treated tobacco for cigarette manufacture. He said that the filling power of maleic hydrazide treated tobacco is as much as 5 to 10 per cent lower that that of untreated tobacco. The term "filling power" indicates the number of cigarettes obtainable from a given weight of tobacco.

A helicopter sprays maleic hydrazide over a plot of broadleaf tobacco in Connecticut's Tobacco Valley.

Mr. LaPorte said that experiments show that maleic hydrazide is quite effective in inhibiting the growth of suckers when it is applied at the time of topping and, also, it increases the yield of tobacco from 10 to 15 per cent as compared to the hand suckered controls. However, he pointed out, the use of maleic hydrazide restricts root development and this reduces the tobacco plants' resistance to wind. As a result a higher incidence of wind damage has been noted on treated tobacco in some years.

Charles R. Partridge, a tobacco grower of Charlottesville Township, Virginia, appeared on the panel in defense of maleic hydrazide from the viewpoint of tobacco growers. He said that a random survey conducted in 1957 revealed that maleic hydrazide tobacco brought 2 to 3 cents per pound more than tobacco that had not been treated. In addition, he said, most growers received an increased yield of 200 pounds per acre. Mr. Partridge also pointed to lower suckering costs per acre and a better grade due to resistance of a treated leaf to "weather fleck" as advantages gained by the use of maleic hydrazide.

Undoubtedly, he said, maleic hydrazide was misused last year in some instances, in the same manner as other practices, such as fertilization and irrigation, have been misused. Farmers who got the best results in 1958, he added, were the ones who had treated their crops in previous years and were familiar with proper methods of application. Some others who were using maleic hydrazide for the first time did not know how to use it to its best advantage. While mistakes were made, growers are learning by these mistakes, he believes, and unfavorable effects will be minimized in the future.

Mr. Partridge said that a number of tobacco growers in his area are considering not growing tobacco in future years if maleic hydrazide cannot be used. Why should these growers be deprived of the use of this sucker control chemical?, he asked. In conclusion, Mr. Partrigde called for steps to be taken to bring maleic hydrazide back into use in 1960.

A representative of the Naugatuck Chemicals Division of Dominion Rubber Co., Ltd., producers of maleic hydrazide, also spoke in favor of its use. A. W. Lougheed, sales manager of agricultural chemicals, said that there is no question of the success of maleic hydrazide for the control of suckers. At an average cost of $12 per acre, he said, maleic hydrazide does a job equal to or better than hand suckering at a cost of $45 per acre.

Maleic hydrazide, when properly used, he asserted, does not produce a thick, leathery, dark tobacco, as had been claimed.

(*Continued on Page* 104)

Frank Washburn
American Cyanamid Co.

Jack Vernon
Niagara Chemical Division, FMC

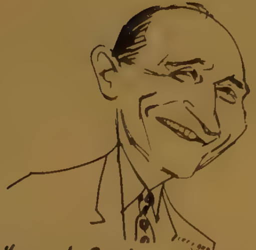
Harry Johnson
Triangle Chemical Co.

George Simches
Planters Chemical Corp.

Merrill Darley
General Chemical Div.

– From the NAC Meeting

Caricaturist Norman Redman made these and numerous other caricatures of pesticide industry figures attending the National Agricultural Chemicals Association convention held October 16-18 at the French-Lick Sheraton Hotel in French Lick, Indiana. The sketches were made in the suite of American Cyanamid Co., who arranged to have Mr. Redman at the meeting.



Howard Grady
California Spray Chemical Corp.

M. B. Turner
AmChem Products

Frank M. Peffer
Arizona Fertilizers

Lee S. Hitchner
National Agricultural Chemicals Association

Charles Barnard
Western Agricultural Chemicals Association

James T. Conner
Champion Chemical Co.

C. D. Sivero
American Cyanamid Co.

August Petrus
Cotton States Chemical Co.

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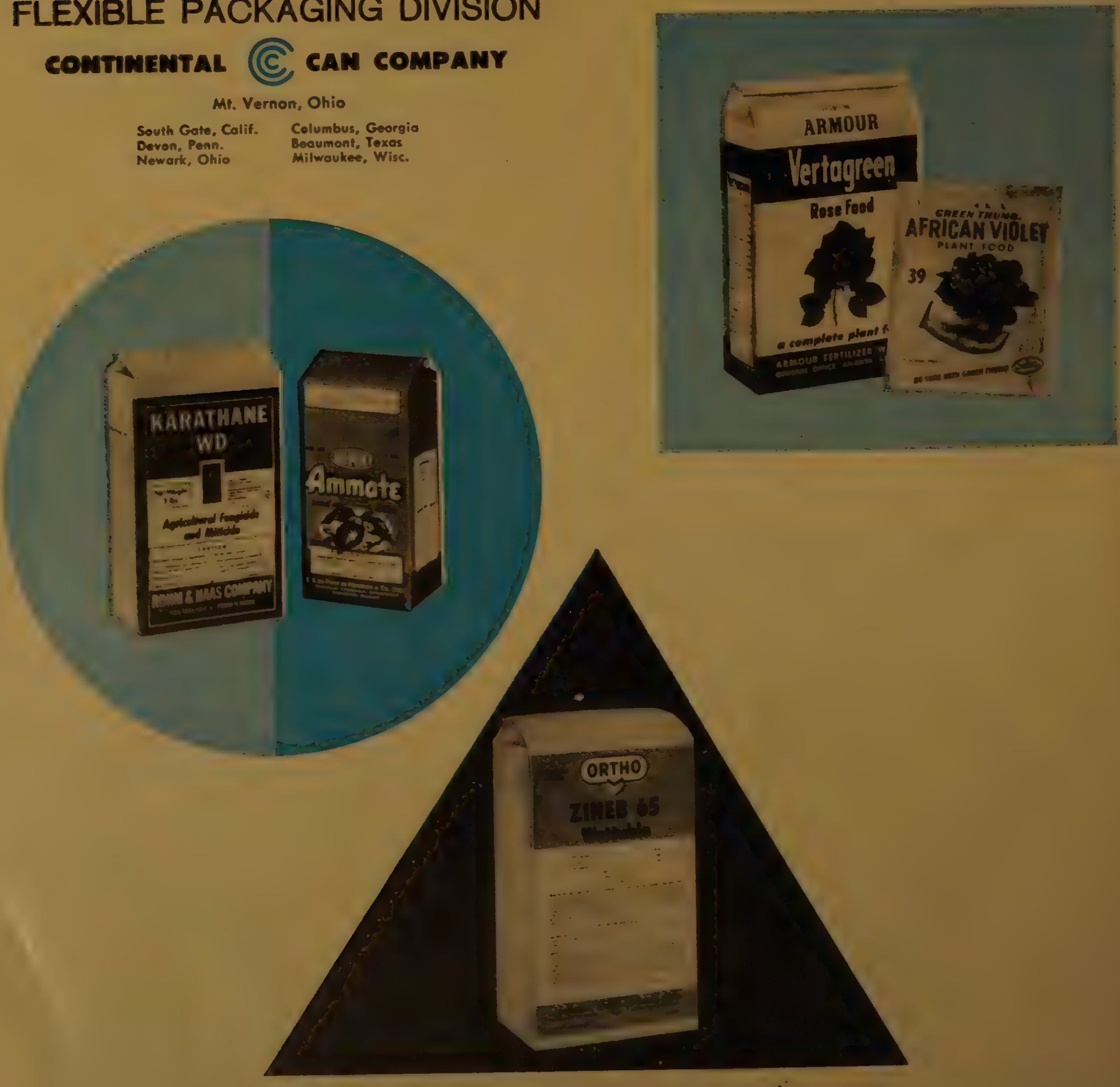

The AGRICULTURAL *Applicator*

- Texas Applicators Meet
- Spraying the Moth Ball Fleet →
- New Business Opportunities
- NATA Meets at New Orleans
- Northwest Applicator Conference

An especially designed spray nozzle arrangement is used to spray grain holds in the moth ball fleet at Tompkins Cove, N. Y. Story on page 58.

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MEXICAN PATENT 55,933

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Texas Applicators Discuss Wages and Public Relations

WAGE-HOUR regulations, State or Federal control of aeronautics, and public relations were three of the topics discussed fully at the annual convention of the Texas Aerial Applicators Association, Nov. 12 to 15 at the Orange House in Orange, Texas.

James S. Bates, member of the Texas House of Representatives, advised applicators to become better acquainted with their local representatives in order to have some voice in matters before their state legislatures. He said that only $33,000 was appropriated in Texas to run the Texas Aeronautics Commission this year and that came only after a long fight in the House of Representatives. There had been a strong move in favor of abolishing the TAC altogether. Mr. Bates, who recently was named Man of the Year for Texas Aviation, said that it would be much better to have a State Aeronautics Commission to regulate private flying than to leave it up to the State legislature, which has very limited knowledge of the problems of agricultural fliers.

Cliff B. Green, Director of the Texas Aeronautics Commission, said that in instances where State aeronautics commissions have been abolished in other states aerial applicators have no voice in writing aircraft regulations and have no representation in the state capitals. In Oklahoma, where there is no aeronautics commission, the State Highway Department enforces aerial regulations.

Continuing the discussion, Mr. Bates pointed out that, in the event the TAA were abolished, the enforcement of aerial regulations would become the job of some other department, such as the Railroad Commission. This would be undesirable, he said, because the aeronautics commission soon would be forced to operate with very limited funds and authority. He cited as a case in point the Rodent Control Commission in Texas which has become a minor facet of an un-related commission and cannot get the proper funds to do a job that is important to agriculture and the public health.

Mr. Green pointed out that the Federal Government would have less reason to concern itself with private aviation if there was a strong State commission exercising some authority over fliers. He warned that the agricultural aviation industry would do well to work together at this time or new rules might tend to favor the large commercial aviation groups at the expense of the aerial applicator.

In an informal discussion at the meeting, Joseph J. Werbke, Region II, FAA, Fort Worth, explained the function of the FAA and said that it is twice as large as the old CAA. FAA, he pointed out, administers as well as writes the regulations that pertain to aviation.

Accidents to applicators, he reported, have been unusually high in Region II, comprised of the eleven Southeastern states. He recommended that all pilots use shoulder harnesses, crash pads, and crash helmets, and also urged precautions when handling chemicals.

In a session on public relations for applicators, Richard D. McNally, *Agricultural Chemicals* magazine, said that publicity is one of the most important tools a custom applicator has in letting the public know about him and the things he does. The agricultural operator would be well advised, he said, to think of his "public" not in terms of an indefinite and shadowy mass, but instead as a number of distinct divisions of "publics." He said that, under normal circumstances, the operator should maintain and cultivate cordial relations with current and prospective customers;

(*Continued on Page* 103)

Shown are (left to right): Ken Medders, Sun Valley Dusting Co., San Benito, Texas; Joe E. Jones, Texas Dusting Service, Rio Hondo, Texas; and Terrell Kirk, Grumman Aircraft Engineering Corporation.

Left to right are: Joe K. Coleman Jr., Scotland, Texas; Harry Vincent, Union Carbide Chemicals Co., Division of Union Carbide Corp., Austin, Texas; and R. S. Williams, Wichita Falls, Texas.

Insect Control in the Moth Ball Fleet

ALTHOUGH admittedly an unlikely place to look for pest control operations, the Hudson River Reserve Fleet at Tompkins Cove, N. Y., provides a summer base for two spraying crews of the Industrial Fumigation Co., New York. Sixty of the ships in the fleet, most of them World War II Liberty Ships, are being used by the U. S. Department of Agriculture to store surplus grain.

Industrial Fumigation's crews, under the direction of Ben Oppenheim, are employed to protect the grain against insect invasion. To do this, they spray, at 30-day intervals, the holds in which the grain is stored. The spraying starts in May and runs through August. The work is done by two three-man crews that can spray 16 holds per day. There are five holds in each ship. Of the three-man crews, one man does the actual spraying, another checks the hose lines, and the third handles the mixing of insecticide and water.

Pyrethrins, produced by Fairfield Chemicals, Food Machinery & Chemical Corp., New York, have been used since 1955 in the preventive spray campaign. During the past season, the first spray, carried out in May, was comprised of 0.3 per cent pyrethrins, 3 per cent piperonyl butoxide, and water from the Hudson River. The following three sprays were comprised of 0.4 per cent pyrethrins and 4 per cent piperonyl butoxide in water. Two quarts of spray were used for each 1,000 square feet of surface. The grain itself is not sprayed, actual spraying is done on the bulkheads above the grain. For this reason, the holds are not filled to the top with grain as they would be if the ships actually were being used as transports. A space of four or five feet between the top of the grain and the top of the hold permits the spray operator to maneuver in the hold and cover all corners with the especially designed, three-nozzle spray gun. The three-way arrangement, shown on page 55, was developed so that the operator can cover the spaces between beams by holding the hose steady while walking atop the grain. A U. S. Department of Agriculture expert works with the spraying teams to check the thoroughness of the spraying.

In the spaces between decks, one application of methoxychlor was used at the start of the spraying season because it is more economical than pyrethrum, according to Mr. Oppenheim, who said that Methoxychlor, if used in the holds themselves, would tend to discolor the grain.

During the past season, Malathion was used in place of pyrethrum on 12 of the ships in an experimental program. Since there are no insects on any of the grain ships, no figures are available on the relative effectiveness of the two insecticides.

Although Navy maintenance teams are on hand at all times to keep the ships in good condition and free from rust, there is no power supply on any of the ships. The spraying crews, therefore, must transport their own gasoline-driven pumps with them to and from the fleet and from ship to ship. The equipment, which includes pump, mixing tanks, and hoses, is set up so that two ships can be sprayed from one location. With both crews working, Mr. Oppenheim's company can spray two ships per day and can treat each ship in the whole grain fleet once a month by working steadily during the four spraying months. In 1957, the spray program called for each ship to be sprayed twice a month. Mr. Oppenheim then had four crews working. It was determined in 1958, however, that the monthly treatments provide excellent protection against insect invasion.

Safety is the main concern of the spray operators, now that the spraying techniques have been developed. There is no toxicity problem, because of the use of pyrethrins, but climbing up and down the ladders into open hatches and crawling over the stored grain in the dim light can be a hazardous job. There is no labor problem, however, as the spraying is best done by young and agile men, preferably teenagers, of which there never seems to be a shortage.

The spraying program has been credited by David J. Ryan, Supervisor of the Grain Fleet, with preventing the entry of any weevils or beetles into the stored grain, which is both hard winter wheat and spring wheat. In addition to the spraying, however, the ships are fumigated each year with standard fumigants, such as Dowfume 25 and EB 5.

A ventilation system in each hold is used to keep moisture at proper levels during the winter months and also is responsible for keeping the grain cool in the summer. Cold air drawn into the holds in the winter is retained through the early summer and keeps the temperature of the holds at levels low enough to discourage insect propagation. The elaborate fan system is powered by electricity supplied from the shore.

During the summer the hatch covers, which were especially designed and constructed of tar paper, are raised slightly to permit warm air to escape. Because of the necessity of entering the hatches regularly so as to spray and take grain samples, Mr. Ryan's staff has developed a system of sliding trap doors on each hatch cover so that the cover, itself, does not have to be disturbed.

Although most of the ships in the fleet have been there since 1946, they still are in good condition. According to Mr. Ryan, any ship in the fleet can be returned to active service in seven days. A team of 58 men inspect each ship every 15 days to check for rust and to see that all wiring and piping still is in good order. The engines are intact and are covered with protective coatings, and an electrical charge system discourages barnacles from attaching themselves to the hulls.

Three U. S. Department of Agriculture crews work full time sampling the grain twice each month. My Ryan puts the wheat samples through a Tag-Heppenstall meter to determine the moisture content and the temperature of each sample is recorded to insure the maintenance of the grain's high quality. Some of the grain in the ships has been in storage there since April, 1954. Grain which had been stored for six years in the James W. Johnson, a ship which recently left the reserve fleet, actually was upgraded higher when it went out than it had been when it was put into the ship. Mr. Ryan credits this to the spraying and the fan system.

There are approximately 6,000 tons of grain in each ship, about 230,000 bushels. At its peak, the grain fleet numbered 97 ships holding over 500,000 tons of grain.

Daily tests of wheat moisture and temperature are made by David J. Ryan, (below) fleet supervisor. Mr. Ryan is putting a wheat sample through a Tag-Heppenstall moisture meter. Ben Oppenheim, (right) Industrial Fumigation Co., prepares a mixture of insecticide concentrate of emulsifiable pyrethrum and piperonyl butoxide plus river water for use against grain insects.

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Preparing For Future Business Opportunities

by John G. Plowden
Geigy Agricultural Chemicals
Division of Geigy Chemical Corporation

Of paramount interest to a farmer when he purchases a service or product, as to any other business man, is return on investment. Therefore, it often is necessary to demonstrate how a service or product will benefit him. In the not too distant past, the job of selling a farmer on the use of aircraft in his operations was a difficult one. The difficulty was due in part to a lack of comparative costs and end returns. The greatest problem, however, was the nature of the potential customer. Up until 1945, generally speaking, the average American farmer was not one who hastily changed his ways of doing things. Economics, of course, had much to do with his resistance to change, although the old human failing of being reluctant to enter into that of which very little is known, had much to do with his resistance.

Fortunately for the aircraft operator this situation does not exist today as much as it did prior to 1945. The average American farmer today is intelligent and progressive and readily can be convinced of the benefits of a new service or product. There are many factors responsible for the change which has taken place and caused the farmer to use the services of the aerial applicator. The applicator has had, whether he recognized the fact or not, many assistants in the selling of his services. These have been County Agents, Agricultural Experiment Station personnel, key farmers, and, I like to think, agricultural chemical salesmen. Another great, if not the most important, factor has been the respect which applicators have earned as respectable businessmen in their areas of operation during the past fifteen years.

The trends in recent years in agriculture have increased the applicator's potential business. The small marginal farms of the mid 1940's are fast becoming a thing of the past. These small farms are being incorporated into larger farms, and the owners or professional managers of these larger farms usually are more progressive. They are financed in such a way that they can avail themselves of the aerial applicator's services and can readily see a profit for themselves when these services are used. Certain farming practices which are now being put into effect will potentiate the applicator business. For example, I saw in South Carolina, during July of 1959, an airplane dusting a one hundred acre cotton field. Prior to the planting of the 1959 crop, this hundred acres was divided into three small fields by surface drainage ditches. Along each of these ditches were a number of trees which interfered with efficient application of insecticides by air, therefore, application of insecticides had been made by ground equipment, prior to that time. The farmer who recently had acquired this property had, in cooperation with the Soil Conservation Service, installed underground drainage tile, filled in the ditches, removed the trees and now had a field in which aircraft could be used efficiently and effectively. I am sure that this same type change is taking place in many parts of the country, and that many areas considered at one time suitable for aircraft are fast being converted so that this fast and efficient means of applying fertilizer, seeds, and pesticides can be used.

It would be nice if there was a new agricultural chemical which was cheap in price, safe to use, would control all agricultural pests, had to be applied daily, and could be applied only by air. Unfortunately, there is no such chemical, which would certainly be an answer to the applicator's prayer. We are continually looking for new chemical compounds for use in agriculture, however, and it is reasonable to expect that, at some time in the near future, compounds will be developed which will be so fool proof for the purposes intended that *all* farmers can readily see the benefits from their use. Chemical manufacturers are cognizant of at least some of the problems which aerial applicators face. They realize that they have to supply a product which can be handled on a practical and economical basis.

At a very early stage in the development of an agricultural chemical, consideration has to be given to the form in which the chemical is to be marketed. Inherent characteristics of a chemical at times dictate the form. This, of course, is undesirable from the manufacturer's standpoint, as one of the criteria for an ideal agricultural chemical would be the ability to lend itself readily to formulation in any form (powder, dust, granular, or liquid) and at any concentration. This, then, means that a product would be easily adaptable to all types of applicators. When a chemical is not adaptable to all forms and concentrations, the most practical and easiest-to-obtain formulation is used until other suitable formulations can be worked out. A case in point is a triazine compound, Simazine, which Geigy is marketing at the present time for the control of weeds and grasses in corn and noncropped land. Originally, and for the last two years, Geigy marketed only a 50 % wettable powder. This product, it was realized, was not suitable for aerial application, so work was immediately undertaken in Geigy's laboratories to formulate a higher concentrated material which would be suitable for aircraft distribution. During 1960, an 80% product will be offered for sale and it is expected that much of this product will be applied by aerial applicators.

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*Presented at the 20th annual meeting of the National Aviation Trades Association, Nov. 17 to 20 at New Orleans.

From statistics available, apparently the application of farm chemicals comprises a great portion of the business enjoyed today by aerial applicators. The agricultural chemical industry, as is the entire chemical industry, is an ever changing one, and even though I doubt if there is today a list of new chemicals which will develop new business opportunities for applicators in the immediate future, I am sure that in the not too distant future, chemicals will be available which will make practical, business opportunities for the aerial applicator which today seem remote.

In closing, I would like to offer this advice to aerial applicators preparing for future business:

1. He should get to know agricultural research workers and become familiar with the projects and problems on which they are working. These people are testing today, the new chemicals of tomorrow.
2. He should get to know the County Agents and other Government people. They transmit much of the information discovered by the experiment stations. Fields not suitable for aircraft operation a year ago, may be ideal today. Extension personnel would know of such changes in their Counties.
3. The applicator should get to know key farmers. A satisfied leading farmer in an area can become one of an aerial applicator's best salesmen and public relations men, and can also keep the applicator apprized of some of the problems he faces.
4. Applicators should read farm periodicals. Many of them report factually on new chemicals under development and also on activities of applicators in other parts of the country. He should read the advertisements in these periodicals. A company that spends millions in research for new chemicals will not mislead in its advertising messages.
5. The aerial operator would do well to become a specialist on at least one important crop and require that other men in his organization do the same on different crops. He should know what pests attack these crops and what chemicals are used for control and be ready to make recommendations.
6. The applicator should get to know the agricultural chemical salesmen who work in his area. They may be able to help solve problems and will be able to tell him of any new chemicals which might be expected to be available in the future.
7. Last, but not least, the aerial applicator should be amenable to change. While it is necessary to take care of everyday problems in his company, he should study the change which is taking place in his industry and among his customers. His competitor is acting now. The ability to recognize opportunities inherent in change is a distinctive characteristic of progressive management.★★

CAAA Meeting Jan. 14-16

An airshow-type demonstration of aircraft, helicopters, and equipment will start off the 10th annual convention of the California Agricultural Aircraft Association in Palm Springs, Jan. 14-16. This meeting marks the 15th anniversary of the organization and will be held at El Mirador Hotel.

All of the current manufacturers of agricultural aircraft are expected to be represented at the demonstration and a loud-speaker arrangement will be provided to permit running accounts of each aircraft as it is presented. In addition, the U. S. Forest Service plans a "borate drop" demonstration of fire control.

A 'Problems Panel," comprised of authorities in all aspects of agricultural aviation; insurance, claims, legal, chemical, engineering, regulations, and safety; will answer questions from the audience at a morning session on the 15th.

During the afternoon session, Claude Finnell, Imperial County Agricultural Commissioner, will delve into the problems of operators and agricultural commissioners. Lloyd Nolen, Mercedes Dusting Service, Mercedes, Texas, will discuss his firm's operations.

Dr. Ralph Fogleman, an authority on chemical injury to animals who has worked closely with governmental officials since the Miller Amendment went into effect, also will speak. Robert Z. Rollins, Chief, Bureau of Chemistry, will close the talks with a description of the physics and magnitude of drift and its implications and consequences under the spray residue tolerances established by law. John Neace, Neace Aviation, Arizona, will end the convention with a luncheon talk entitled "The Price of Security is Freedom."

•

Ag-2 At Yugoslav Fair

The Transland Ag-2 agricultural airplane was a feature attraction at the United States Pavilion during the International Trade Fair held at Zagreb, Yugoslavia.

Jack Meyer, Transland Aircraft technicians who took the plane to Zagreb, reports that, because of the availability of low cost labor, it will be some time before ground and air mechancal equipment used in the T. S. will be accepted for large scale use in Yugoslavia. On some of the state-owned farms, however, a few agricultural aircraft including helicopters, are spraying for insect control.

Industry Panel is Feature of NATA New Orleans Meeting

CLOSER cooperation between the National Aviation Trades Association and the National Agricultural Chemicals Association to combat the bad publicity received by the pesticide industry was called for by John G. Plowden, Geigy Agricultural Chemicals, Ardsley, N. Y., at the 20th annual convention of the NATA, Nov. 17 to 20 at the Hotel Monteleone in New Orleans.

Mr. Plowden was speaking as a member of the panel on new business opportunities for aerial applicators. The panel was comprised of representatives of the pesticide industry. Mr. Plowden listed steps which may be taken by individual applicators to improve both their operations and their relations with their communty, creditors, and customers. The full text of Mr. Plowden's remarks appears on page 61. H. E. Meadows, Diamond Alkali Co., Cleveland, Ohio, appeared on the panel to acquaint the applicators with the possibility of using granules. He said that they would be useful primarily in more restricted areas because of the hazards associated with the drifting of other types of pesticides. Some advantages of granules listed by Mr. Meadows included their ability to get to the ground, even through thick foliage. He said that, although granules probably will never replace liquids, they are used in some areas where liquids cannot be used.

Speaking of possibilities for the future, Mr. Meadows said that an experimental program currently is going on in West Texas on the possibility of dormant brush spraying of herbicides. He pointed out that granular 2,4-D normally is not applied by air but that it could add a new activity for aerial applicators and, also, extend their normal working season if the dormant brush spraying tests prove successful. He said that next spring he plans to test granules on rice for weed control.

L. E. Bewick, Agricultural Chemicals Division, Velsicol Chemical Corp., Chicago, discussed the actual application of granular insecticides and said that they seem to provide a more even swath when applied by air than do either dust or liquids. Referring to the use of granular insecticides in the recent fire ant program in the southeast, Mr. Bewick said granular material was being applied at the rate of 12½ to 20 pounds per acre. Granules were selected, he said, because they are less hazardous than sprays or dust and they have a longer effectiveness.

R. L. Warren, Agricultural & Sanitary Chemicals Dept., Rohm & Haas Co. spoke on the aerial application of fungicides. He said that the difference between the application of fungicides and insecticides is that insects move around and come into contact with insecticides, while spores stay in one spot and fungicides must come to them.

Ground spraying, he said, at 400 to 600 psi. and 150 to 200 gallons per acre has done a good job in controlling potato blight. On the other hand, he pointed out, low pressure-two gallons per acre aircraft sprayers used for insecticides and herbicides have not proven effective for fungicide applications.

The introduction of more potent fungicides and of aircraft equipment with high capacity, high pressure pumps and booms with approximately 40 #10 or #12 nozzles finally has made the aerial application of fungicides appear practical. He cited trials carried out in 1958 and 1959 in which aerial application of fungicides was equal to, or, in some

John Keays, (left) Union Carbide Chemicals Co., New York; and Lloyd Nolen, NATA vice president for agriculture.

Mr. and Mrs. Asa Burroughs, Austin Texas. Mr. Burroughs is secretary-treasurer of the Texas Aerial Applicators Assn.

J. R. Wheatley, (left) "Crag" Agricultural Chemicals, Memphis, and F. L. Bailey, General Chemical Division, Allied Chemical Corp.

cases, superior to ground application. He said, however, that slightly higher rates of fungicides are recommended for aerial application.

Discussing a new pesticide that can be applied by air, J. R. Wheatley, Southern Regional Manager, Crag Agricultural Chemicals, Union Carbide Chemicals Co., Memphis, said that Sevin is safe for aerial applicators to apply, and does not irritate the eyes or skin. In addition to being an effective residual boll weevil killer, he said, Sevin offers control of bollworm, pink bollworm, thrips, fleahoppers, aphids, leafworms, lygus bugs, and leaf perforators. It does not control mites, he continued, but it is compatible with sulfur and miticides, and can be used in combination if mites are a problem. Mr. Wheatley explained that Sevin is a carbamate and is available in both spray and dust.

Robert Z. Torrence, Nitrogen Products, E. I. du Pont de Nemours & Co., Wilmington, Del., presented a color movie entitled "Greener Pastures' prepared by Du Pont to promote the use of fertilizer on grass. The movie is available to applicators for showings to groups.

Lloyd Nolen, NATA vice president for Agriculture, said that many of the aerial applicators' problems stem from the fact that not enough people understand the function of the applicator. He called for an improved public relations program by the aerial application industry. Mr. Nolen spoke at a breakfast meeting that opened the aerial applicator portions of the NATA program.

He said that aerial applicators are operating under a waiver that "permits them to operate illegally" and urged that, instead, they should have a set of maintenance and flight regulations written especially for the agricultural aviation industry. The gap between agricultural aircraft and other aircraft is so great, Mr. Nolen declared, that they no longer can operate under same regulations.

Speaking of public relations, Mr. Nolen deplored the fact that aerial applicators haven't found the time to do a decent public relations job. He advised applicators to maintain closer relationships with chemical manufacturers. Every time we sell a spraying job, he said, we sell somebody's chemicals.

Donald L. Miller, of Donald Lerch & Co., Washington, D. C., spoke on improved public relations and said that, to a lot of people, aviation is a new and unknown element, as are agricultural chemicals. These people, he said, have to be sold on the subject of chemicals and aerial application.

Delbert Williams, left, and Chuck Sellers of Sellers Aviation, Inc., Bakersfield, Calif.

Listing some of the material used in the past by the National Agricultural Chemicals Association to convince people of the value of agricultural chemicals, Mr. Miller described the NAC Safety Kit. The kit was developed in the form of a folder and sent to all members of the organization. He cited NAC's critical memorandum of economic poisons that was sent to doctors and hospitals to explain the symptoms of pesticide poisoning and list the antidotes. The NAC also supports and publicizes poison control centers throughout the United States.

Mr. Miller listed things applicators can do to improve their public relations. He said they should become familiar with all the chemicals that they use and should know where poison control centers are located. Before spraying an area, he said, applicators should contact local doctors and tell them what chemicals are being used so that, in the event of a poisoning, the doctor can treat the victims promptly without wasting time looking up the symptons.

In a session on applicator-government relations, Jay A. McCausland, General Operations Branch, Bureau of Flight Standards, FAA, said that his organization now has the responsibility for chemicals dropped from aircraft as well as aircraft themselves. He said that the FAA has assured the United States Congress that the aerial application problem can be solved without undue restrictive legislation. The FAA, he reported, is preparing objective regulations in general terms to supervise aerial application. Under these regulations individual aerial applicating firms will have to accept the responsibility for their operations.

The FAA, Mr. McCausland said, will require that proper supervision be exercised over operations at all times. He pointed out that this does not mean, however, that an individual pilot cannot do a job by himself if he is reliable. The FAA will issue certificates to operators who will, in turn, be responsible for their pilots and airplanes. The responsibility, he said, now is on the operators to see that their pilots and aircraft are in good shape.

Arthur Geiser, Methods Improvement Section, Plant Pest Control Division, ARS, USDA, talked on government spraying projects and said that only a few changes in contracts are anticipated. Problems this past season, he said, generally were operational.

He pointed out that work on granular insecticides is increasing and this is the area in which the greatest improvement can be made. Granular materials, he said, must be applied evenly, with no skips or overlapping. Overlapping leads to excessive deposits, he reminded, and can result in a residue problem.

At the start of a government spraying program, Mr. Geiser said, operators should check the performance of their distributing devices before leaving home base. He explained that it takes a lot of time to correct swath widths at the spraying site, where mechanics usually are not available. Merely looking at the swath behind the airplane, he reminded, can be most misleading. He described a simple method for checking swath widths. Dishpans (15 to 20) should be placed at five foot intervals to catch the granules as they are applied. The contents of each pan then can be poured into a glass tube and the height of granules from each pan noted on a chart. This, he said, will provide a good picture of the deposit.

He admitted that it is difficult for an applicator to adjust to a 30 foot swath when he has been operating with 100 to 120 foot swaths with liquids. Mr. Geiser pointed out, however, that he recently returned from Michigan where swath checking took two weeks for a Japanese beetle program over 4,800 acres in which the actual spraying time was only two days.

Another thing Mr. Geiser urged the applicators to do was to obtain good, fast loading equipment. Valuable flying time, he said, often is lost in loading.

The statistical analysis of applicator accidents was discussed by Russell J. Abbott, Air Safety Investigator, Bureau of Safety, CAB. He reported that no booklet on accidents has been prepared this year to cover 1958 but that the CAB hopes to have such a booklet published during 1960. Speaking of figures published for 1957, he said that pilot experience by itself is no criterion for determining how good an applicator a man will be.

Other interesting things found in the 1957 figures, he said, were that shoulder harnesses were in use in only 60 per cent of the ac-

(Continued on Page 85)

Northwest Aerial Applicators Meet In Yakima for First Convention

MORE than 200 aerial applicators, dealers, and representatives of chemical manufacturers from a five-state area attended the first annual Aerial Applicators Conference at the Chinook Hotel in Yakima, Washington, Oct. 26 and 27. The conference was sponsored by the Norkem Corp., Yakima, a distributor of agricultural chemicals.

Cooperating on the program and planning were Washington State University, Oregon State College, and the Washington State Aviation Association. Those attending came from Washington, Oregon, Idaho, Montana, and California.

A film on foliar nutrition of plants, made by the Atomic Energy Commission and produced at Michigan State University, was exhibited at the conference. It illustrated the speed of translocation and the effectiveness of leaf-intake of several different elements. Frank Judy, president of Agricultural Chemicals, Inc., Walnut Grove, Calif., discussed phosphorus-containing PX-1 foliar nutrient and told of its use on many crops based on information developed from radio-active tracer tests in trans-location.

The aerial application of Amino-Triazole was explained by Clark Amen, American Cyanamid Co. The use of Trysben 200 and Dybar and their future potential was discussed by William Jackson, E. I. du Pont de Nemours & Co., Palo Alto, Calif.

Wesley E. Yates, department of agricultural engineering, U. of California, Davis, showed slow motion movie studies of aircraft and helicopter spray patterns and discussed drift studies and experiments which have been made by the U. of California.

The promise of Triazine herbicides in cheat grass control was discussed by Dr. W. R. Furtick, associate agronomist, Oregon State College. He pointed out that there are some problems with the use of these materials and the possibilities of soil residues. The potential use of these materials by aircraft on wheat and in the arid areas of Oregon and Washington would be quite great, he said, when these problems were answered.

Dr. Tom Muzik and Dr. Carl Johanson, Washington State, discussed the practical aspects of knowing weeds and chemicals in relation to their application by aircraft and the effect on bees of the new materials being applied by aircraft.

The safe handling of pesticides was the topic of a talk presented by Dr. R. F. Glasser of the Agricultural Chemicals Division of the Shell Chemical Corp., New York. The Aerial use of Maleic Hydrazide (MH-30), and its increase in use on potatoes and onions during the past season in the Pacific Northwest, was covered by John Coke, Naugatuck Chemical Co., Portland, Ore.

Graham Randall, Stauffer Chemical Co., Portland, discussed the future use of microbial pesticides, which are, at present, in the experimental stage.

On the second day of the meeting, demonstrations were held of the Grumman Ag-Cat, Rawdon agricultural aircraft, the Bell helicopter, and the Swathmaster spreader equipment. A short program at a luncheon between the flying demonstrations included talks by manufacturers and distributors of aircraft and equipment. Wesley Yates showed slides relating to pumps and equipment installations on aircraft and presented the results of his tests on this equipment. Movies were shown of the Transland Ag-2 aircraft and the Swathmaster spreader.

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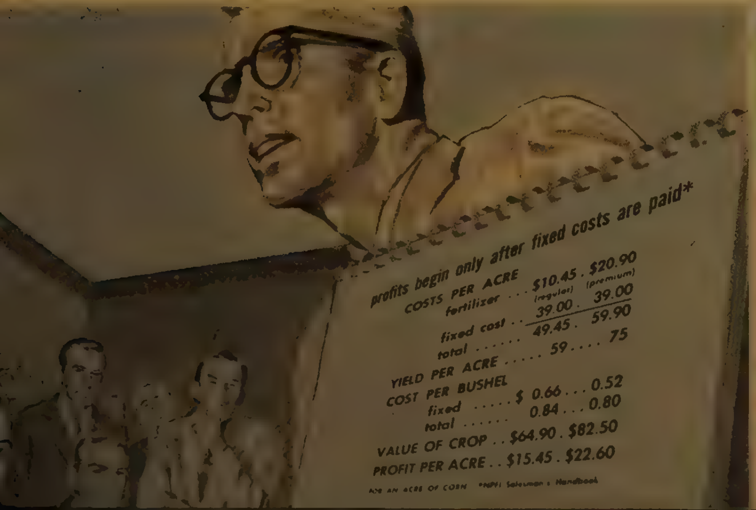
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PEST ROUNDUP

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Survey & Detection Operations, Plant Pest Control Division, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in U.S.D.A.'s pest surveys throughout the U.S.

By Kelvin Dorward

Spotted Alfalfa Aphid on Increase

THE spotted alfalfa aphid, which was of very little concern throughout most of the summer, was becoming a problem in some areas by October. The heaviest buildup of the insect since 1956 was recorded in central and southeastern Arizona. Honey dew deposits and feeding damage were heavy in fields, especially on susceptible alfalfa varieties. Populations in many fields built back following one application of insecticide, and the second application appeared to be necessary in some instances. Populations of the spotted alfalfa aphid were becoming heavy in many Dona Ana County, New Mexico, fields by the latter part of October. Most of the seedling alfalfa in the county was treated.

The first record of the spotted alfalfa aphid for the year in the state of Washington was in early October. Distribution was almost identical with that of 1958, with aphids found along the Columbia River from Whitcomb to Plymouth, in the Kennewick and Burbank areas, around Benton City and Prosser, in Walla Walla County near Gardens and near Asotin along the Snake River. In Oregon, the aphid was still on the increase around Hermiston, with damage apparent. The insect was found October 6 near Stanfield, where it was absent 10 days previous.

Light infestations of the spotted alfalfa aphid were found in the Loyalton, Sierra County, California, area in October. This is the first record for the county. Other states reporting light infestations of the aphid during October included Utah, Colorado, Texas, Oklahoma, Kansas, and Missouri.

Heavy Spittlebug in Ohio

RESULTS of a survey conducted in September indicate the probability of severe attacks of the meadow spittlebug in parts of Ohio in the spring of 1960. Adult populations found during the 1959 fall survey indicate that the central and southwestern areas of Ohio can expect severe damage to forage crops in 1960, unless control measures are undertaken. Populations found in the northwestern and extreme southern areas were very low and damage is not expected next year. In other sections of the state, damage can be expected in some fields, but it will not be widespread.

The annual spittlebug survey in forage in West Virginia was conducted in 15 counties. The state average was very low, being only 1.43 adults per 100 sweeps. As a comparison, the average in central Ohio was in excess of 600 adults per 100 sweeps.

Pink Bollworm Survey

AS of October 17, 1,336 acres in Maricopa, Pinal, and Graham Counties, Arizona, had been found infested with pink bollworm larvae and was showing definite evidence of damage. Larvae were collected in fields involving some 600 acres and from gin trash or lint cleaners representing over 350 acres. Definite evidence of damage had not been found on acreage slightly in excess of 350 acres. Populations in most instances were light. The infested acreage was greatest in Graham County in fields not under the 1959 eradication program. As a matter of fact, only two instances of infestation persisting despite the control program had been found as of late October.

Inspections of lint cleaners and gin trash indicate that populations of the pink bollworm are considerably lower throughout Oklahoma than in 1958 to the same time. Gin trash inspections in Texas showed that infestations were lighter in most counties than in previous years. In Louisiana, gin trash inspections during September were negative for the first time in several years in the southern part of the infested area. However, larvae were found in gin trash in Caddo, Claiborne, DeSoto and Lincoln Parishes in northern Louisiana. Pink bollworm was found for the first time in Cleveland County, Arkansas, during September.

Forest Insects

DURING the summer of 1959, there was a serious outbreak of a pine sawfly in the pines of North Carolina, Virginia and Maryland. A recent survey by the U. S. Forest Service and cooperating states showed the defoliation caused by the insect to be rather widespread. The estimated acreage of pine defoliation, which ranged from light to complete, was 42,000 in North Carolina, 2,094,000 in Virginia, and 192,000 in Maryland.

In Marinette County, Wiscon-

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WASHINGTON REPORT

By Donald Lerch

THE Food and Drug Administration's surprise crackdown on cranberries "tainted" by residues of amino triazole now appears to be a case of the Washington merry-go-round going too fast. Those of the public who read the small print are becoming aware that Health, Education and Welfare Secretary Arthur S. Flemming's scare announcement on cranberries had scant justification.

Whatever the motivation for the crackdown, Washington observers see the incident as a trial balloon. FDA is understood to have several other crops and chemicals under consideration for similar treatment. The aim of the action in the cranberry case was apparently to test both the effect upon farmers and upon the general public. If this is the case, we might infer that FDA was surprised by the indignant reaction both from growers,—and from the public.

It is understood here that several groups of growers and processors are contemplating court action against HEW for unjustly damaging their industry. If so, FDA would be put in the uncomfortable position of trying to justify claims that cranberries bearing residues of the accused weed killer could possibly hurt humans.

FDA can expect little help from USDA or anyone else in this issue. In fact, we have seldom seen as direct a slap in the face as Agriculture Secretary Ezra Taft Benson handed to his fellow Cabinet member, HEW Secretary Arthur Flemming, when he followed Flemming's scare announcement by saying he, Secretary Benson, intended to eat cranberries as usual on Thanksgiving.

Some Washington farm leaders, at least, feel this is the kind of situation in which something has to give, and the betting is that the loser will be HEW Secretary Flemming.

* * * * *

You can watch for the expansion of the National Plant Food Institute's soil fertility program into a number of new areas during the next year or two. This has become probably NPFI's number one promotion program, and the expansion is going in two directions. One is geographic.

The program, which began a few years ago in a couple of Southern counties, has now been spread to counties in 12 to 14 states. The program is just beginning this year to go into the productive Midwest.

Behind the county by county expansion of the soil fertility program is a brand new kind of thinking on the promotion of new farm practices. Unlike the Extension Service approach of educating everyone at once, NPFI has concentrated maximum promotion on single counties, arousing farmer interest in the program, then moving in with the educational message. This approach gives people in a state experience with the program.

The pay off is that as the soil fertility program expands, the consumption of plant food goes up. This is proof to the cynics that concentrating promotion in a single county to get one successful program is a successful method for spreading a new and beneficial farm practice.

* * * * *

U.S.D.A. personnel are understandably unhappy over the criticism that has come their way on the fire ant program. They point out, and rightly so, that the program was not the gay brainstorm of some entomologist of the "what will we wipe out next" school, but rather a job given the department by Congress. They remind that the fire ant program was initiated by Congress at the request of state groups, and U.S.D.A. was simply given the job of implementing the controls which others had decided were wise and necessary.

* * * * *

You can expect a new sales figure to start cropping up in top level statements about the size of the pesticide industry. For many years estimated sales figures have been pegged to sales at the manufacturers level. While these figures have shot up at a phenomenal speed, the totals were so small relative to announced sales of other industries, few people outside the industry have been impressed.

Now the industry is switching its sales reporting procedures to include reports on the estimated industry sales at the users level. The figures for 1959, for example, will be sales of $278 million at the manufacturers' level and sales of

(*Continued on Page* 95)

Arcadian News

Volume 4 For Manufacturers of Mixed Fertilizers Number 12

Technical Tips for Better Ammoniation

NEW WAY TO PREVENT BAG SET

While conducting pilot plant studies on the use of the pre-reactor to make high analysis fertilizers, Nitrogen Division experts also ran bag storage tests. Producers will find the results of these tests most interesting. Details—including the formulation and processing data for each product made—are given below:

Four Formulations

Four grades were made: 14-0-14, 16-0-8 and two 16-8-8 formulations. The 14-0-14 and 16-0-8 materials were made with a nitrogen solution composed of 19% ammonia, 72.5% ammonium nitrate, 8.5% water, and a total nitrogen content of 41%. Sulphuric acid was used to neutralize the free ammonia. Regular, no-granular muriate of potash was the source of K_2O, and dolomite was used for filler. Dolomite particle size was about 80% through 200 mesh.

One of the 16-8-8 formulations (16-8-8A) used the same raw materials as above, with the addition of normal and triple superphosphate to supply the missing P_2O_5. In the case of the 16-8-8B product, the nitrogen solution used contained 25.3% ammonia, 69.2% ammonium nitrate, and 5.5% water—with a total nitrogen content of 45%. Normal superphosphate and wet process phosphoric acid supplied the P_2O_5. Other raw materials for both of these 16-8-8 formulations were the same as in the 14-0-14 and 16-0-8 products.

Of the materials charged in making these four products, ammonium nitrate—considered by many to be the most influential factor in caking—varied from 502 pounds per ton (14-0-14) to 580 pounds per ton (16-8-8A). See Table 1.

TABLE NO. 1 — FORMULATIONS — POUNDS PER TON

Fertilizer Grade	14-0-14	16-0-8	16-8-8A	16-8-8B
Formula				
Nitrana 4M (19NH_3, 41N)	693	790	801	—
Nitrana 7 (25.3NH_3, 45N)	—	—	—	735
Normal Super (18.96 A.P.A.)	—	—	560	646
Triple Super (44.1 A.P.A.)	—	—	133	—
H_3PO_4 (58.2)	—	—	—	89
H_2SO_4 (93)	412	465	353	389
KCl (60 K_2O)	473	270	270	270
Dolomite	490	555	20	20

(Continued on following page.)

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TABLE NO. 3—BAG STORAGE TESTS

Fertilizer Grade	14-0-14		16-0-8		16-8-8A		16-8-8B	
% Kaolin Coat (1)	0	2	0	2	0	2	0	2
Initial Moisture, %	0.69	0.60	1.01	0.90	0.44	0.48	0.28	0.40
Inspections and Grade (2)								
30 day	D	A	D	B	A	A	A	A
90 day	D	B	D	B	A	A	B	A
180 day	—	B	D	B	B	B	D	B
Final Moisture, %	—	0.93	1.03	1.05	0.79	0.86	0.93	0.97

(1) Kaolin Clay—Specific surface of about 16,000 cm^2/gm.

(2) Grading Code—A—Free flowing when bag is removed from pile.
B—Free flowing after one 3-foot drop on flat side.
C—Lumps remaining after one 3-foot drop on flat side.
D—Two or more 3-foot drops required to break bag set.

For all four formulations, the basic process equipment used included: a pre-reactor, pug mill mixer, dryer, cooler, screens and a crusher. Total throughput capacity was about 1000 pounds per hour, giving a production rate of 500 pounds of product per hour at a 1 to 1 recycle ratio. Product size was taken as minus 6 plus 20 mesh.

In making the 14-0-14 and 16-0-8 grades, all of the nitrogen solution and acid were processed through the pre-reactor and overflowed continuously as a slurry to the pug mill at a temperature of 291°F and a water content of 5.8%. When this slurry combined in the pug mill with the muriate of potash, dolomite and recycle the resulting mix had a temperature of about 185°F and contained 2 to 3 per cent water. From the pug mill the mixture passed to the dryer where moisture was reduced to 1% or less. Material from the dryer then went to the cooler, and from there to the screens. Oversize material was diverted to the crusher. The product size was taken out and fines were returned to recycle.

While processing the 16-8-8 products, a portion of the nitrogen solution was fed to the pug mill to ammoniate the superphosphate. The remainder of the nitrogen solution, all of the sulphuric acid, and (for the 16-8-8B product) the phosphoric acid were fed to the pre-reactor.

Conditions in the pre-reactor for the 16-8-8A formulation were basically the same as for the 14-0-14 and 16-0-8 grades. However, for the 16-8-8B formulation, a somewhat higher slurry moisture and a slightly lower pre-reactor slurry temperature were used. Other 16-8-8B process conditions—in the dryer, cooler, screens and crusher—remained the same. For process operating conditions in detail, see Table 2.

TABLE NO. 2—OPERATIONAL DATA

Fertilizer Grade	14-0-14	16-0-8	16-8-8A	16-8-8B
Temperatures °F				
Pre-reactor Slurry	291	291	293	284
Dryer Feed	187	183	176	144
Dryer Product	187	171	199	185
Cooler Product	140	136	158	129
Moistures %				
Pre-reactor Slurry	5.8	5.8	5.8	6.5
Dryer Feed	2.1	2.6	2.3	2.7
Product Out	0.2	1.0	0.4	0.3

Clay Coating Tested

To determine the effect of a coating agent on product storage characteristics, equal amounts of product in each grade were coated with a 2% clay coat to supply material for comparative testing of coated and uncoated products. A kaolin type clay with a specific surface of about 16,000 cm^2 per gram was used. However, other clays or kieselguhrs with equivalent total surface would probably serve just as well for this purpose.

Test Ran For 6 Months

Storage data on bags of coated and uncoated products were obtained over a six month storage period. All test bags, of 5-ply construction (3 paper and 2 inner asphalt liners), were the 100 lb. size. They were positioned two and three bags up from the bottom, in piles twelve bags high. The storage area was a one story unheated cinder block building with a concrete floor.

Each test bag was inspected and graded for degree of caking at the end of 30, 90 and 180 days of storage. The *uncoated* 14-0-14 and 16-0-8 products, having an initial moisture content of 0.69% and 1.01% respectively, were found to be severely caked at each of the inspection periods. These products had a hard bag set requiring two or more drops of the bag on the flat side from a height of about three feet to break bag set. From this it would be natural to expect that both of these products would cake rather severely in either bulk or bag storage. Somewhat lower initial moistures could be expected to improve storage condition.

The coated 14-0-14 and 16-0-8 products, having about the same initial moisture as the uncoated, showed essentially no caking over the entire test period. Inspection after 30 days showed that the 14-0-14 was free-flowing, and that the 16-0-8 had only a slight bag set, requiring only one drop of the bag to make it completely free-flowing. After 90 and 180 days, both products were in the same condition as the 16-0-8 at 30-day inspection.

16-8-8 Fares Better

The 16-8-8 products, having a somewhat lower initial moisture, showed good condition, with the exception of the uncoated 16-8-8B at the 180 day inspection. Both the coated and uncoated 16-8-8A and the coated 16-8-8B were free-flowing after 30 and 90 days of storage, and showed only a slight bag set after 180 days of storage. The uncoated 16-8-8B was free-flowing at 30 days, had a slight bag set at 90 days, and was severely caked after 180 days of storage. See Table 3.

Where Coating IS Needed

Results of these tests indicate that X-O-X fertilizers (no P_2O_5) made by the pre-reactor process should be dried to a very low moisture level, preferably below 0.5%. In addition, they should be coated with an inorganic coating material such as clay or kieselguhr in order to have good condition in storage. As regards NPK grades made by this process, good storage condition would be expected, provided the product is dried to a very low moisture level, preferably below 0.5% or less. The addition of a coating would be beneficial, but it is not as important as for the X-O-X grades.

Nitrogen Division PILOT PLANT is Modernized

The finishing touches in the extensive modernization of Allied Chemical Corporation's Nitrogen Division pilot plant have just been completed. New and redesigned equipment and facilities make this famous research and development center capable of testing just about every type of fertilizer manufacturing technique imaginable.

The original Nitrogen Division pilot plant has contributed advance after advance to the technology of ammoniation processes for semi and full-granular mixed fertilizer. Many other products, now serving farmers and homeowners, have benefited as well.

To Serve You Better

A full staff of experienced engineers and technicians at Nitrogen Division's pilot plant, working closely with technical service people in the field, has always been available to mixed goods producers. Now—with new and additional plant facilities covering a wider range of manufacturing techniques, this pilot plant service has become even more valuable for producers. So, if you have a formulation or manufacturing problem in *your* plant, be sure to take advantage of this expert assistance. There's no obligation. Write Technical Service, Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.

Corn is a heavy user of sulphur. So are cotton, legumes, onions and cabbage. Some crops need more sulphur than phosphorus. Many soils are running out of sulphur fast. It pays to tell farmers your mixed fertilizers contain sulphur.

SULPHUR IS A BONUS VALUE IN YOUR MIXED FERTILIZER

It will pay you and your dealers to tell farmers about the big extra benefits they get from the sulphur you put in your mixed fertilizers. Farmers pay for a guaranteed content of nitrogen, phosphoric acid and potash. At no extra cost, you also give them sulphur which is a vitally important plant food. Many farmers are not aware of this fact. They do not realize the need for sulphur in crop production until serious deficiencies appear in their soils.

The fertilizers you make with ammoniated superphosphate are a rich source of sulphur. Normal superphosphate contains more sulphur and more calcium than phosphorus. When you use sulphuric acid to neutralize "excess" ammonia in producing high-nitrogen mixtures, you add sulphur to your fertilizer. And, of course, sulphate of ammonia in fertilizers supplies sulphur for crop production.

Depending on your production technique, it is easy to calculate the amount of sulphur your mixed fertilizer contains. *Make this a sales point!* Tell your customers they are getting valuable quantities of sulphur and paying nothing for it except transportation costs. This is a big extra bonus!

Leading Crops are Heavy Users

Crops, on the average, remove about as much sulphur from the soil as they do phosphorus. Yet the average soil contains only half as much sulphur as phosphorus. Cotton, corn, tobacco, legumes, grass, onions and cabbage are heavy users of sulphur and require considerable amounts for high yields.

Sulphur disappears fast, if it is present in the soil. Leaching can remove 30 to 60 pounds per acre per year. Erosion often removes six pounds of sulphur per acre per year. On most farmland, leaching and erosion carry off much more sulphur than rainwater adds to the soil.

If your mixed fertilizers contain sulphur, you and your dealers can profit by bringing this fact to the attention of your farmer-customer. SULPHUR can be a SALES-MAKER for YOU!

HERE'S THE BIG LINE OF

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

Arcadian® NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60° F	Approx. Vap. Press. at 104° F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

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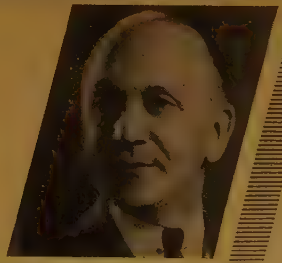
Fertilizer Views and News



Dr. Vincent Sauchelli

Dr. Sauchelli is Chemical Technologist for National Plant Food Institute.

Technology and Fertilizers on Modern Farms

FERTILIZERS are rightly judged as indispensable in modern farming if profit is one of the objectives. Since today's farmers, in the United States at least, operate their farms as industrial plants, it is necessary to focus on profit if they are to survive. Modern agriculture in our country is our biggest industry and exerts a tremendous influence, for good, on our national economy. Hence, the importance of the role commercial fertilizers play in the general economy.

Fertilizers make it possible to increase crop yields per unit of land at relatively little cost. These increases can be very substantial; in fact, in some areas of the country having light, sandy soils, it would not be possible to farm on a commercial basis, if fertilizers were unavailable. By increasing the yield per acre, a farmer is able to reduce the crop unit cost per acre, and in this way assures himself a profit. That this is a fact appreciated by our farmers is reflected by the constantly increasing annual consumption of commercial fertilizers in this country and throughout the world.

Consumption in 1957-58

In fiscal 1957-58 the consumption of *actual plant food* in the United States and its territories rose to a new record high: over 6,500,000 net tons or a rise of 2.1 percent over the total for fiscal 1956-57. If we state the record in terms of total fertilizers as such, that is, not in equivalent terms of nitrogen, phosphate and potash, the consumption, 22,515,763 tons, showed a slight drop of about one percent.

This comparison points up a trend that should be recognized not only by the statistician but management as well. There is a steady trend toward the consumption and production of fertilizers of higher plant food concentration. One ton of say 10-20-10 is equivalent in plant food content to two tons of 5-10-5. The proportion of these higher analyses throughout the country is increasing. This fact is reflected in the consumption statistics. Many state chemists and the U. S. Department of Agriculture now report fertilizer production and consumption statistics both as grades and as equivalent actual plant foods. It seems advisable to have the data in both forms in order to get a more comprehensive picture of the trend. For example, as just indicated above, it is possible to make a wrong interpretation of the true situation if only the tonnage of grades is given. A firm may be selling this season fewer tons of certain grades as compared with several seasons back, when actually it is selling more plant food because of the higher analysis of the goods.

New Concept of Fertilizer Use

A newer concept of fertilizer use is developing and it has its impact on farm production and fertilizer manufacturing processes. The function of modern fertilizers is to raise the level of soil fertility to a degree that will permit the growing of improved varieties of commercial crops. Such crops have been developed by plant breeders so that they have much higher capacities to produce harvests. To realize the benefits of these increased capacities it is necessary to apply more plant food per acre to the crops. Hybrid corn varieties for example have been developed to where they can produce 200 to 250 bushels per acre if they are given proper soil management and the necessary plant foods. It takes chemicals to produce chemicals. Farmers who are operating commercially have big capital investments in mechanical equipment and power and cannot be satisfied with yields of 60-80 bushels per acre. The fertilizer industry has contributed to the development of higher efficiency in crop production by modernizing its technology and marketing patterns and by providing concentrated fertilizers. These fertilizers being more concentrated can usually be bagged and transported and handled at lower cost, and all these factors have enabled the industry to maintain lower prices per unit of plant food.

The Future

The fertilizer industry has moved parallel with progressive, modern agriculture in many ways. The industry has almost tripled in size since pre World War II and has installed modern, efficient processes at heavy cost to meet modern requirements. The industry has good reason to look ahead with optimism. Research is constantly developing new methods and better materials.

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NEWS about the TRADE

Realign Armour Organization

The Armour Agricultural Chemical Co., Atlanta, Ga., has been organized into two major divisions—Fertilizer and Nitrogen-Phosphate. The Fertilizer Division will include Armour's 27 complete fertilizer manufacturing plants in the U. S. as well as one in Cuba and one in Puerto Rico.

R. L. James

H. V. Miller

The Nitrogen-Phosphate Division will include Armour's newly-acquired nitrogen plant in Crystal City, Mo., and phosphate mining and processing facilities in Bartow, Fla., and Columbia, Tenn., and a triple-superphosphate manufacturing plant at Bartow.

H. Vise Miller has been named vice president and general manager of the Fertilizer Division and Robert L. James is vice president and general manager of the Nitrogen-Phosphate division.

•

Herbicide Market Study

A comprehensive marketing study on the purchases and applications of herbicides has been completed by the Marketing Research Division of Doane Agricultural Service, Inc., St. Louis.

The study is designed to reveal changes taking place in the herbicide market and is available to individual companies on a subscription basis.

•

Big DDT Order To Montrose

Six suppliers of DDT will provide the General Services Administration with 47,750,000 pounds of wettable 75 per cent grade material for this year's malaria eradication program of the World Health Organization.

Montrose Chemical Corp., Los Angeles, is getting the lion's share of the business and will supply GSA with 24 million pounds of DDT. In all, GSA is buying 47.75 million pounds at a total cost of around $12.5 million. The other 23.75 million pounds will come from Olin Mathieson, Allied Chemical, Diamond, Geigy, and Lebanon Chemical.

•

Brassfield Joins Velsicol

T. W. Brassfield, formerly Western Division sales manager for the Naugatuck Chemicals Division of U. S. Rubber, has joined the Velsicol Chemical Corp., Chicago.

•

Hercules To Expand On Coast

The Hercules Powder Co., Wilmington, Del., has announced plans for a multimillion dollar expansion of its West Coast facilities at Hercules, Calif. The expansion will include the construction of new manufacturing facilities for the production of slow nitrogen release urea-form.

•

Dr. Walter Murphy Dies

Dr. Walter J. Murphy, editorial director of the American Chemical Society's journals, died Nov. 26 in Washington, D. C. He was 60 years of age.

•

Heads Baltimore Division

Albert C. Brooks has been named manager of the Baltimore sales division for the U. S. Industrial Chemicals Co., division of National Distillers and Chemical Corp., New York. He succeeds James F. Whitescarver, who has retired.

Head Of National Potash

Thomas G. Ferguson has been elected president and chief executive officer of the National Potash Co., New York.

Mr. Ferguson joined National Potash as vice president and general manager when the company was formed in 1955. He has been in charge of the development and operation of the company's mine and refinery 32 miles east of Carlsbad, New Mexico.

•

CIL Production Manager

K. A. Shantz has been appointed production manager of the agricultural chemicals division of Canadian Industries Ltd., Montreal. Mr. Shantz, who joined CIL in 1935, succeeds L. V. Clegg, who has been named general purchasing agent of the company.

•

Study Heptachlor Tolerance

The Food and Drug Administration, Department of Health, Education and Welfare, has announced that it may revoke the 0.1 part per million tolerance for heptachlor on 34 raw agricultural commodities, including fruit, vegetables, grain, and forage crops, and instead put a zero tolerance in effect.

The FDA said that residues of heptachlor on forage crops convert in large measure through weathering to heptachlor epoxide, which they indicate is more toxic than heptachlor. Investigations by FDA and the USDA have shown that heptachlor epoxide, when fed to cows, is deposited in their milk and meat. In addition, residue studies disclose that the combined residues of heptachlor and heptachlor epoxide on crops are likely to exceed 0.1 part per million, the FDA said.

Agricultural Chemicals received the following statement from Velsicol Corp., in connection with the FDA announcement:

"The publication relating to tolerances for heptachlor and heptachlor epoxide in the *Federal Register* of October 27th, is a proposal by the FDA. It is not a ruling or an order. The proposal states that chronic toxicity studies have not been completed on heptachlor epoxide. The Administration did not, at that time, have results of the recently completed chronic toxicity studies.

"The results of these studies, contrary to previous assumptions, show heptachlor epoxide is not more toxic than heptachlor. These results are being submitted to the Food & Drug Administration this week. Since heptachlor epoxide is not as toxic as it was thought to be when the proposal was published, a favorable ruling allowing for the major uses of heptachlor on food crops to continue is expected."

•

Stauffer Appoints Two

Stauffer Chemical Co., New York, following its merger with Victor Chemical Works, has appointed two new executives.

Directors elected August Kochs as vice- chairman of Stauffer and Hothe Weigel as senior vice president of Stauffer and president and general manager of the Victor Chemical Works division. Mr. Kochs was chairman of Victor and Mr. Rothe was president, before the merger.

•

To Expand Nitrogen Plant

The Grace Chemical Division of W. R. Grace & Co., New York, is planning a major expansion of its nitrogen plant in Woodstock, Tenn. New capacity of the plant will bring the yearly ammonia tonnage total to more than 160,000 tons. Originally, the capacity of the urea plant was 50,000 tons.

J. S. Coey

T. W. Willers

Named In Hooker Shifts

Thomas W. Willers (right), a vice president of the Hooker Chemical Corp., Niagara Falls, N. Y., has been assigned responsibility for the company's Eastern Chemical, Phosphorous, and Durez Plastics Divisions, as well as for corporate engineering. John S. Coey (left) succeeds Mr. Willers as general manager of the Eastern Chemical Division He had been general sales manager of the division.

In other moves announced by the company, F. Leonard Bryant was assigned responsibility for corporate research, marketing ,and general development; and Robert E. Noble was named general manager of the Phosphorous Division.

•

Central Buys Green Leaf

Central Chemical Corp., which operates factories in Hagerstown; Gettysburg, Milton, Everett and Butler, Pennsylvania; and Barker and Alton, New York, has announced the purchase of the plants of the Green-Leaf Fertilizer Co., located at Andover, Ohio and Lockwood, Ohio. In this connection, Central, in addition to fertilizers, will add a complete line of agricultural chemicals at these plants and will serve the Lake District from Cleve., Ohio to the N. Y. line.

The Central Chemical Corporation has just completed an expansion program at its Hagerstown plant, which will double its capacity for grinding of 75% DDT Wettable Powder and other related air-milled products.

Central, in addition to the plants of the Green-Leaf Fertilizer Company, has recently acquired the plant of the Koller Fertilizer Company at Glen Rock, Pennsylvania, which will serve the rich York County area. The corporation also is operating a plant at Bridgeville, Delaware, formerly owned by the Newton Chemical & Supply Company. This plant will serve the Eastern Shore of New Jersey, Delaware, Maryland and Virginia.

Tallow as Herbicide Carrier

University of Arizona botanists see the agricultural chemical industry as a large new user of tallow, — specifically as a "carrier" for weed control chemicals. E. B. Kurtz, of the University reports that "the fatty acid esters of sugars appear to be a new and untested type of carrier that seem to meet all the requirements of a herbicide carrier." Since sugar esters of fatty acids are now being made commercially from tallow,—a "broad commercial use for tallow in this form is suggested.

•

Custom Spray School

Custom spray applicators, as well as farmers, will hear about new developments in controlling face flies at the annual Illinois Custom Spray Operators' Training School, January 27-28. The school will be held at the University of Illinois, Urbana.

H. B. Petty, chairman, pointed out that face flies first attacked Illinois cattle this past summer. At the time, few control measures were known. Research, however, is currently in progress to find more effective control and results will be reported at the school. Mr. Petty is an extension entomologist at the University of Illinois and Illinois Natural History Survey.

Other topics at the school will include new developments in ear worm control, soil insecticides, turf diseases and lawn seeds, granular versus liquid herbicides and the relation between weeds and crop yields.

•

Stauffer Research Center

Stauffer Chemical Company has completed plans to build a major Research Center at Richmond, Calfornia. It will be located on a 10-acre tract recently acquired by the company adjacent to the present Richmond plant and research laboratories. Construction of the first unit of the new Research Center will begin in January . Completion is scheduled for early 1961.

TOXIMUL LF is a new, *universal* emulsifier for soil insecticides and other toxicants in most liquid fertilizers. You'll find Toximul LF not only makes possible more effective compounding of "one shot" combined pesticide and liquid fertilizer, but greatly simplifies your emulsifier inventory as well as formulations. Included in the broad range of compositions emulsified by Toximul LF is a 3 pound Heptachlor concentrate or a 4 pound Aldrin concentrate into such fertilizers as 8-24-0, 5-15-5, 9-9-9, and 4-10-10. Excellent storage stability of the emulsified concentrate is assured by Toximul LF's extremely low moisture content – less than 1%.

TOXIMUL R and S. Learn about this new single emulsifier pair that effectively emulsifies *all* toxicant systems.

combine liquid fertilizer
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in ONE spray
with ONE emulsifier

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McCarthy Jr. Heads Vulcan

V. I. McCarthy, Jr. V. I. McCarthy, Sr.

Vern I. McCarthy, Jr., has been named president and director of marketing of Vulcan Containers, Inc., Bellwood, Ill., manufacturer of steel shipping containers. He replaces Vern I. McCarthy, Sr., who moves up from presidency to chairman of the board.

Mr. McCarthy, Jr., is the third generation of the McCarthy family to serve the company as president. The senior McCarthy will continue to play an active role in the long range planning and research, the announcement said.

The 43-year-old corporation manufactures a wide range of steel shipping pails, drums and tinplate cans ranging in size from one ounce to 55 gallons.

•

Penick Acquires LeGear

S. B. Penick & Co., New York, has acquired the controlling interest in Dr. LeGear, Inc., St. Louis, Mo. The LeGear firm is a manufacturer of proprietary animal health products.

All of LeGear's sales, manufacturing, and research activities will remain in St. Louis, and Dr. Daniel H. LeGear will continue as president.

•

License Hydroponics Units

Hydroponics, Inc., Indianapolis, Ind., has signed a contract with Manuel Gonzalez of Puerto Rico, appointing him the first licensee outside of the U.S. for the manufacture of Hydroponics Green Feeds Units, which grow green grass to maturity in six days. Mr. Gonzalez is president of the Puerto Rican Milk Producers Assn. and owner of the Dorado Farms.

•

To Build Largest Plant

A contract has been signed between the Italian companies, Montecatini and Ansaldo, and the Neyveli Lignite Corp. Private, Ltd., for the construction of the world's largest urea plant at Neyveli on the Indian peninsula, about 140 miles from the city of Madras.

The plant, to be designed and built by Montecatini, will have a capacity of 500 tons per day and will employ the Fauser-Montecatini process for urea manufacture. Completion is planned for late 1962.

•

LSU Forestry Symposium

Louisiana State University's ninth annual Forestry Symposium will be held April 6 and 7, 1960, at the LSU School of Forestry in Baton Rouge. Topic for the meeting is "The Use of Chemicals in Southern Forests."

Seventh Texas Conference

The 7th annual Agricultural Chemicals Conference will be held on the campus of Texas Technological College at Lubbock, Texas, on Feb. 9 to 11, 1960. The emphasis of the program is to be "Quality in Production."

The program will feature speakers from research and industry who are expected to discuss methods and problems in fertilizer, insecticide, and herbicide use in the Southwest. The conference is sponsored by the Texas Technological College, Texas A. & M. College, and the West Texas Chamber of Commerce.

Farmer Cooperatives Called Threat to Private Enterprise

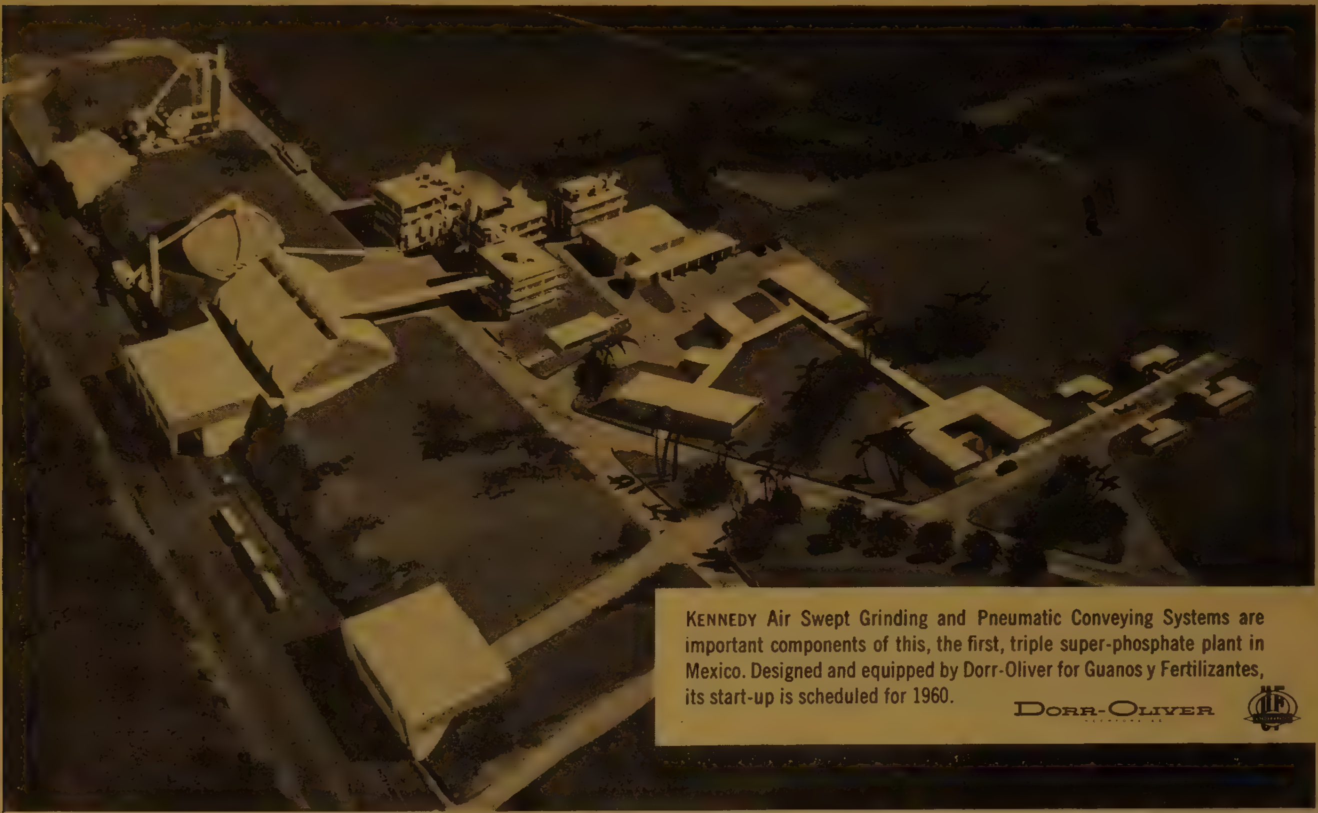
FARMER Cooperatives were described as a growing threat to the agricultural chemical industry in a talk by Felix N. Williams, vice-president of Monsanto Chemical Co., St. Louis, before members at the recent annual convention of the International Chemical Workers Union held in Cleveland. Because of the unique tax-free position that they enjoy, the co-ops, Mr. Williams charged, are rapidly undermining free enterprise in the fertilizer and pesticide industries. Farmer co-ops, he asserted, "now make and sell about $325 million worth of fertilizers a year out of an industry total of $1⅓ billion, and their share of the market is growing rapidly each year. They can undercut prices by as much as 25 per cent simply because of their special tax benefits.

"Both labor and management must be alert to opportunities to urge our congressional representatives to pass legislation which will put manufacturing cooperatives on an equal basis with corporations so that neither we nor they enjoy any unusual advantage."

Mr. Williams charged that the farmer co-ops have already made major progress toward wiping out the smaller independent fertilizer manufacturers, and, unless the competitive advantage of the tax-free status is reversed he predicted a "gradual decline and eventual shutting down of fertilizer operations conducted by the major chemical companies." He also reported a similar threat to independent manufacturers of pesticides, and companies dealing in feed, seeds, building materials, petroleum products and farm machinery and equipment.

Emphasizing the importance of a healthy chemical industry to the nation's security and economic health, the speaker observed that another threat is apparent in the increased competition American chemical manufacturers are facing from abroad. European chemical companies can produce on a much lower labor cost, he asserted. Specific examples cited on three large-volume chemicals were labor costs per ton for European chemical companies of 33, 40 and 47 per cent respectively as compared with American labor costs. Thus foreign chemicals are often delivered in the American market below cost levels for American producers. In research too, Mr. Williams pointed out, European companies have a tremendous advantage in lower wage levels for research personnel. Spending the same amount for research, he asserted, "they can employ about four times as many people as we can," and research, he reminded, "is the lifeblood of our future growth."

KENNEDY for grinding & conveying phosphates

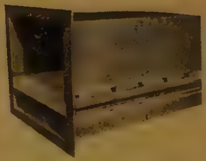


KENNEDY Air Swept Grinding and Pneumatic Conveying Systems are important components of this, the first, triple super-phosphate plant in Mexico. Designed and equipped by Dorr-Oliver for Guanos y Fertilizantes, its start-up is scheduled for 1960.

DORR-OLIVER

KENNEDY Ball Mills are noted for high tonnage and low cost processing of phosphate rock and other agricultural chemicals:

- Lowest maintenance cost—cannot be jammed or damaged by tramp iron or other foreign material
- No periodic shut downs for wearing part replacement
- Grinding media is replaced without interruption
- High capacity and product fineness remain constant—month after month
- Careful basic design and pressure lubrication assure high mechanical efficiency
- Reliable feed control and overall reliability provide high production with minimum manpower
- Higher capacity in single units—less space and structural steel per ton of capacity and lower initial investment.



KENNEDY AIR-FLOAT Conveyors provide trouble-free air-gravity conveying of dry materials:

- There are no moving parts—nothing to wear—nothing to maintain
- Only small volumes of low pressure air are needed—uses less power
- Operates quietly—has high capacity—requires little headroom
- The conveyed materials are completely enclosed—there is no dust
- Permits flexible design—directional changes are simple
- Can be made from corrosion resistant alloys
- Eliminates lubrication, complicated gears, belts and chains, spare parts and down time for maintenance.

Consult KENNEDY for further details. Let us show you the many advantages KENNEDY equipment can offer you.

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Cranberry Controversy Brings Variety of Comments

ACTION of the U. S. Food and Drug Administration last month in stopping the sale of cranberry products because of possible contamination by amino triazole has resulted in a controversy that has had the subject on the front pages of newspapers all over the country ever since Secretary Flemming's action.

The facts are that amino triazole herbicides were employed prior to harvest in some growing areas (Washington State and Oregon) contrary to label directions. Since amino triazole had been found, in dilution of ten parts in a million, to have caused thyroid cancer in rats, (but not in larger test animals) Food and Drug refused to make a tolerance rating. Thus, when it learned of presence of contamination in the current cranberry crop a warning was issued which led to action by numerous state and local health authorities banning sales of cranberry products in many areas.

It has been reported to *Agricultural Chemicals* that in some areas growers had used amino triazole herbicides, contrary to label instructions, prior to harvest, as a way to cut weed growth and make harvesting of the crop easier. Labels advised against pre-harvest use of the herbicide, but did not specifically state the nature or the degree of the hazard involved in such pre-harvest use.

Comments on Secretary Flemming's action by various interested parties are summarized below:

American Cyanamid Co., (one of two manufacturers of amino triazole) "The extremely small amounts (of amino triazole) present on cranberries could not offer any significant risk to the consumer . . . Tumors were found in rats only after a lifetime of feeding in a diet containing approximately 100 times as much of the chemical as has been found on the contaminated lots of cranberries."

Ambrose E. Stevens, v-p and gen. mgr., Ocean Spray Cranberries, Inc., "There is not a shred of evidence that a single human being has been adversely affected by eating allegedly contaminated cranberries . . . nor that amino triazole causes cancer in human beings."

L. S. Hitchner, exec. sec., Natl. Agr. Chemicals Assn., "If the product is used according to label directions it will not result in any residues on the harvested crop and therefore presents no hazard to the public health . . . Action by F.D.A. in stopping the sale of certain cranberry products because of possible contamination emphasizes, once again, the importance of following directions on the label of a pesticide."

Dr. Ordway Starnes, assoc. dir., N. J. Agr. Exp. Station, "Current alarm over pesticide residues in cranberries will have served a useful purpose if an aroused public pauses to appreciate that the American market basket is filled with the most wholesome food on earth . . . One reason why our food supply is so superior is the availability of safe and effective chemicals for controlling insects, diseases and weeds."

Chemical Week "The cranberry debacle is a blessing in disguise for the chemical industry . . . The monetary loss to cranberry growers will be a real lesson to any food-crop producer who tries to make a few extra dollars by misapplying a pesticide just before harvesting — when there's a risk of a residue at too high a level."

Food Engineering "If the current furor over cranberries does not force a modification in the Federal food law, industry and agriculture will be the victims of more unjust damage in the future . . . Cranberries are the victims of an impractical provision in the Federal food law,—a restriction that should be modified by act of Congress . . . Known as the Delaney Clause, this provision unrealistically allows no tolerance for a safe, minute amount of a substance that might cause cancer in large, prolonged doses."

Sen. Case (R.—N.J.) "A conflict exists between two federal departments, the Food and Drug Administration and the Department of Agriculture, over the regulation of food additives, herbicides, and pesticides . . . Something should be done to resolve the departmental conflict".

Hon. J. Waldo Monteith, Canadian minister of National Health, "The presence of trace amounts of aminotriazole in some lots of the current crop of cranberries does not in itself constitute a danger to health".

•

Agrico Plant In Operation

Fertilizer started moving from Agrico's newest plant at Johnson Creek, Wisconsin, early in November. The plant includes facilities to store and handle Agrico's complete line of farm fertilizers and turf & garden plant foods.

Agrico's fertilizers are manufactured by The American Agricultural Chemical Company at 39 plant locations east of the Missouri River and in Kansas. In addition to manufacturing their complete line of farm fertilizers and turf & garden plant foods, the company produces a broad line of industrial chemicals, and is a basic producer of phosphate rock and phosphate products.

•

Raymond Bag Names Three

C. R. Keener has been appointed to a sales post by the Raymond Bag Corp., Middletown, Ohio, to cover the central district with headquarters in Louisville, Ky. In other moves announced by the company, Ralph T. Rose and George Clifton have been appointed salesmen in the Midwestern district.

Mr. Rose makes his headquarters in Chicago and Mr. Clifton is at the Detroit office.

•

Fills New Post For Panogen

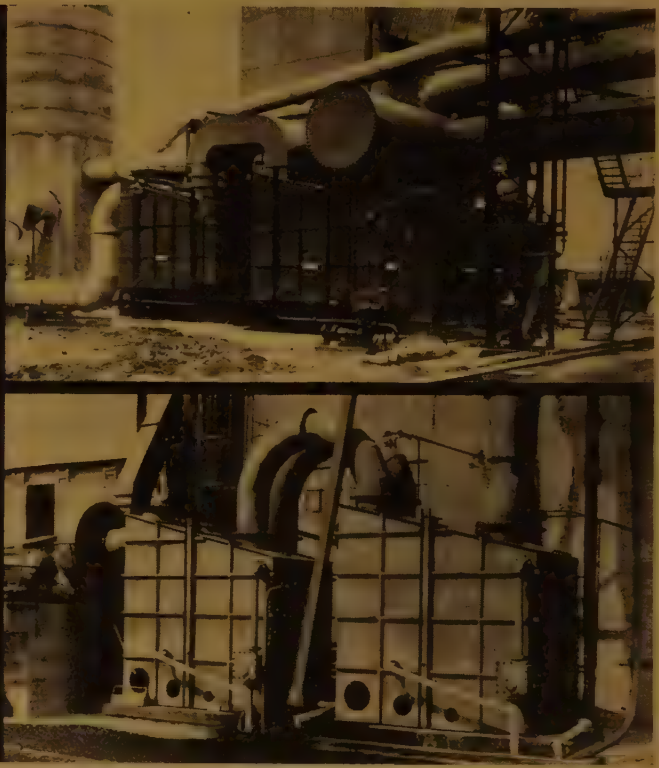
Dr. Raymond Sevin, formerly technical director, has been appointed assistant general manager for the Panogen Co. division of Morton Chemical Co., Chicago.

typical fertilizer
plant installations
prove efficiency of the

DOYLE SCRUBBER

for removal of solids and fumes
from gas streams

American Cyanamid Co., Brewster, Fla.



Top photo: Scottish Agricultural Industries, Ltd., Leith, Scotland.
Lower photo: Norske Zinkkompani A/S, Odda, Norway.

- *simple design*
- *high scrubbing efficiency*
- *low water requirements*

The Doyle Scrubber provides a highly efficient yet extremely simple, compact and rugged means for removing solids and fumes from gas streams. It is particularly adapted to fertilizer plant applications, including treatment of waste gases from phosphate fertilizer driers and several other operations. Its versatility is demonstrated in such additional applications as fume control in smelters, treatment of SO_2 gas prior to acid manufacture, ammonia recovery and possible use in fly ash collection.

The Doyle design makes possible high solids concentration in the scrubber effluent, a low water requirement and high heat transfer rates. Its efficiency has been conclusively proved in several installations. Doyle Scrubbers are constructed, sold and installed under license by Dorr-Oliver. They make an important addition to the extensive line of D-O equipment already offered to the fertilizer industry. For full information, write to Dorr-Oliver Incorporated, Stamford, Connecticut.

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Third New Mexico Conference

The third annual Agricultural Chemical Conference will be held Jan. 13 at New Mexico State University, University Park, N. Mex. Results of research on insecticides, nematocides, fungicides, herbicides, and fertilizers will be the general subjects of the conference.

Frank Irons, principal agricultural engineer with the USDA Agricultural Research Service at Wooster, Ohio, will be the guest speaker. His subject will be ground and air application of pesticides. Mr. Irons has, for the past several years, been working on the development of application machinery.

The chemical conference will precede the Fruit and Vegetable Short Course at NMSU on Jan. 14-15.

•

Indiana Fertilizer Conf. Held

"What a Farmer Expects From His Fertilizer Dealer" was the subject of a panel discussion at the Indiana Fertilizer Conference, Dec. 2, at Purdue University, Lafayette, Ind. Participating in the panel were E. C. Weiss, Sinclair Petrochemicals, Inc., and three Indiana farmers.

Dr. V. M. Ruttan of the University's agricultural economics department discussed the role of fertilizer in the changing agricultural economy, and members of the University's agronomy department reported on crop production practices, efficient fertilizer, soils research, and fertilizer recommendations for Indiana crops.

•

Heads Sales For Wise Co.

Lester Christopher has been appointed vice president in charge of sales for the Robert S. Wise Co., Inc., of Wichita, Kans. He has been with the U.S. Department of Agriculture, the Winru Packaging Co., and the Douglas Chemical Co.

•

12th N.C. Pesticide School

Dr. Emol A. Fails, associate professor of economics at North Carolina State College, will speak on "How Do You Sell Your Product?" at the 12th annual Pesticide School to be conducted by the N.C. State School of Agriculture in cooperation with the College Extension Division, Jan. 13-14, in Raleigh.

Among other speakers will be Dr. Roy L. Lovvorn, director of research for the N.C. Agricultural Experiment Station. The program will be divided into three sections: weed control, entomology, and plant pathology.

•

World Agricultural Fair

In one of 24 major displays at the United States Exhibit at the first World Agricultural Fair, the Atomic Energy Commission will show how scientists use radioactive "labels" to "tag" destructive insects and then follow their migrations. The fair will be held in New Delhi, India, December 11 to February 14.

The United States exhibits, being organized by the Department of Commerce, the U. S. Information Agency, and the Atomic Energy Commission, also will include rust-resistant wheat, a stiff-stalked rice which stands up well under rainstorm and wind, and various strains of disease-resistant beans.

Chitinase As Fungicide

A recent joint publication of reports by Mrs. Wanda K. Farr and Dr. M. T. Hilborn of the Maine Agricultural Experiment Station, disclosed that chitinase enzyme can destroy the fungus that causes apple scab and black mold disease of many plants and plant products.

Dilutions of chitinase as low as one part in ten million parts of water were effective in destroying the protective coating of chitin that protects the disease-causing organisms.

Mr. Hilburn and Mrs. Farr reported that the use of enzymes in plant disease control is not limited to this action of chitinase. Other enzymes, they said, may be just as effective in attacking other materials known to be in the cell walls of fungus organisms.

•

Rainbow To Expand

Rainbow Chemicals Ltd., Tilbury, Ontario, Canada, will undertake a major expansion program involving new office facilities, new storage tanks, and improved plant process facilities.

The company primarily is a bulk liquid fertilizer manufacturer.

Badertscher Opens New Office in Baltimore Science Center

A. Edison Badertscher (right) has moved into new offices at the Science Center Building in Baltimore, Md. (shown below) Mr. Badertscher is available as a consultant on household, industrial, and garden insecticides, pet products, insect repellents, and soluble plant foods, as well as for the preparation of labels on products that fall under the Federal Insecticide, Fungicide, and Rodenticide Act. Since 1931, he had been connected with McCormick & Co., Baltimore, as chief entomologist and horticulturist.

The Science Center Building also houses the American Bio-Chemical Laboratory, Inc., in addition to Dr. Badertscher's Insect Control & Research, Inc. Dr. Eugene J. Gerberg is director of American Bio-Chemical.

Eradication Not Feasible

An all-out eradication program against the screwworm in the southwestern United States and adjacent Mexico does not appear feasible at the present time, according to the U. S. Department of Agriculture.

Lack of natural barriers against the fly in the vast infested areas of the Southwest and Mexico is a key factor in this decision. Officials are said to believe that any joint program by the U. S. and Mexico should be confined to research and field trials on sterile male flies and other techniques that might be used to fight the screwworm.

•

New Stauffer Ag Chem Plant

Stauffer Chemical Company has begun construction of a new plant at Richmond, California which will double the firm's capacity to produce agricultural chemicals for the northern California market. It is scheduled to be in operation by February. The new plant will replace the company's present agricultural chemicals unit at Berkeley, California.

•

Third Arizona Conference

The third annual Arizona Fertilizer Conference will be held Jan. 20 and 21 at the University of Arizona with the cooperation of the Soil Improvement Committee of the Arizona Agricultural Chemicals Association and the National Plant Food Institute.

•

West Virginia Names Jones

J. R. Jones has been named sales manager for the Kansas City district of the Multiwall Bag Division of the West Virginia Pulp and Paper Co., New York. He succeeds Roy E. Jury, who has been named district sales manager for Westvaco's Hinde & Dauch container division on the West Coast.

Sees Need For Accurate Information on Insect Damage

"WE just don't know what we are doing," commented Dr. Richard Wellman, Union Carbide Company, at the Conference on Losses Due to Agricultural Pests, held November 4-5 at the National Academy of Science-National Research Council Building in Washington, D. C.

Wellman explained to the sixty members and guests of the Agricultural Board Committee on Agricultural Pests that both the farmer and industry need to become more efficient. He said one of the most helpful devices would be the development of accurate loss data from which industry could instigate a definite control program.

Insects cause twice as much damage every year as forest fires, according to Dr. Wellman. Yet, until we can be given some indication of where to start to correct this situation it is impossible for industry to do much.

Speaking for the USDA and the Agricultural Research Service, Dr. T. C. Byerly, Deputy Administrator, said there is no other area in agriculture as important as that of agricultural pests, and the losses caused by them. Byerly said it is absolutely essential to have an accurate account of agricultural pest losses for both industry and the farmer.

It is often difficult to measure losses accurately, he continued. For example, several diseases are affecting the cotton industry in the southern states. So far, no effective control measures have been developed, thereby resulting in greatly reduced yields in some areas. Texas is not affected with these diseases, said Mr. Byerly, and the cotton industry could be moved to this region. "But, what would happen to the South? What could you grow on some of these small 75-acre farms? It's almost impossible to measure this type of loss, yet it must be regarded as part of loss data," stated Byerley.

These two addresses were background for discussions of the Committee and Subcommittee members during the conference.

Represent Hercules On Coast

James L. Scott, left, and Don M. Allison, right, have been assigned as technical representatives on the West Coast by the Hercules Powder Co., Wilmington, Del. Mr. Scott makes his headquarters at Portland, Oregon, and Mr. Allison is at the San Francisco branch office.

At the same time, the company announced the appointment of Charles R. Staib as technical representative for Southern California and Arizona. He is headquartered at Riverside, Calif.

•

IMC Buys Moneka Plant

The Plant Food Division of International Minerals & Chemical Corporation has purchased a fertilizer plant in Bartlesville, Oklahoma.

John D. Zigler, division general manager, said modernization of buildings and machinery, and addition of new equipment will make the plant a leading producer of mixed fertilizers in the southwest. It will specialize in production of Rainbow, IMC's premium plant food. The plant was formerly operated by Moneka Farm Stores, Inc., and has been inactive during the past year.

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Alabama Pesticide Conf.

The Alabama Association for the Control of Economic Pests and the Agricultural Experiment Station of the Alabama Polytechnic Institute are sponsoring a pest control conference on the A.P.I. campus at Auburn, Ala., on Feb. 17 and 18.

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Colorado Meeting Jan. 28

The annual meeting of the Colorado Agricultural Chemicals Association will be held in the Cosmopolitan Hotel, Denver, Jan. 28 and 29. An open session on the 29th will be a joint meeting with officials of Colorado State University and the Colorado State Department of Agriculture.

Cotton Council Meets Feb. 8-9

The 1960 Convention of the National Cotton Council will be held at the Statler Hilton Hotel in Dallas, February 8-9. These are dates for the general sessions. A number of newsworthy reports, however, are expected to emanate from committee sessions which begin on Friday, February 5, and continue through Sunday.

Approximately a thousand cotton industry leaders are expected for this meeting, at which research and promotional activities for 1960 will be approved. The 18 cotton-growing states and the six segments of the raw cotton industry—producers, ginners, merchants, warehousemen, cottonseed crushers, and spinners — will be represented.

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To Manage USI Office

John A. Putnam has been appointed manager of the Atlanta, Ga., office of the U.S. Industrial Chemicals Co., Division of National Distillers and Chemical Corp., New York. He has been a salesman operating out of the New Orleans sales division and has been located at Atlanta for the past two years.

•

Accident Prevention School

A. I. Raney, safety director, Phillips Petroleum Co., Bartlesville, Okla., was director of the Southwest Regional School of Accident Prevention in Fertilizer Plants held Nov. 12 and 13 in Pasadena, Texas.

Among the speakers at the course were Emerson M. Jones, Jr., Midwest technical service supervisor, Nitrogen Division, Allied Chemical Corp., New York; William N. Cox, Jr., School of Industrial Engineering, Georgia Institute of Technology, Atlanta; and Albert E. Walker, regional supervisor, the Travelers Insurance Co., New York.

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Crop Improvement Is Theme

"Crop Improvement Through Better Fertilization" was the theme of the crops and soils program at Dover, Delaware, Nov. 23-24, under the sponsorship of the Delaware Crop Improvement Association.

Fertilizer specialists from Tennessee, North Carolina, Virginia, Maryland, Delaware, and Washington, D.C., participated in a short course on fertilizer Nov. 24. The program emphasized the importance of fertilization and other sound fertility practices.

•

Cyanamid, Ltd. Urea Plant

A multi-million dollar urea plant which obtains its raw materials from a neighboring steel mill and is built on reclaimed land has been put in operation in Hamilton, Ontario, Canada, by Cyanamid of Canada Limited, a subsidiary of American Cyanamid Company.

According to Dr. L. P. Moore, president of Cyanamid of Canada Limited, the new plant is Canada's first facility for the production of urea.

Orchard Pests Are Topic

Control of orchard pests is among the main topics being discussed at the 55th annual meeting of the Washington State Horticultural Association, Dec. 7 to 9, in the Liberty Theater, Wenatchee.

A panel composed of Stanley C. Hoyt and Everett Burts, entomologists at the Tree Fruit Experiment Station, Wenatchee; Ford H. Harries, Wenatchee; and Marvin Brunson and Fred Dean, Yakima, U. S. D. A. entomologists, will review some of the latest findings on apple and pear pest control.

•

New Grace Sales District

The Grace Chemical Division of W. R. Grace & Co., Memphis, Tenn., has formed a new sales district to cover Kansas, Missouri, Kentucky, and the southern half of Illinois and Indiana.

The office of the new district is at 8230 Forsyth Avenue, St. Louis.

Northeastern Weed Control Conference January 6 to 8

A discussion of new herbicides from industry will be a feature of the 14th annual Northeastern Weed Control Conference to be held Jan. 6 to 8 at the Hotel New Yorker, New York.

Other sessions will feature talks by Dr. L. L. Danielson, USDA, on "Developments With Granular Herbicides and Equipment for their Application;" and Dr. M. W. Meadows, GLF, on "Promising New Chemicals for Weed Control."

Methods for improving public acceptance of the use of herbicides will be outlined by Dr. Roger Latham, outdoor writer for the *Pittsburgh Press* and formerly director of research for the Pennsylvania Game Commission.

Officials meeting to discuss plans for the 14th annual Northeastern Weed Control Conference, Jan. 6 to 8, are: left to right (seated); Dr. L. G. Utter, Diamond Alkali Co.; Dr. D. A. Schallock, Rutgers University; Dr. E. M. Rahn, University of Delaware; and C. T. Noll, Pennsylvania State University. Standing, left to right; Dr. W. E. Chappell, Virginia Polytechnic Institute; Dr. M. G. Wiltse, Dow Chemical Co.; A. B. Lindquist, Stauffer Chemical Co.; and Dr. S. N. Fertig, Cornell University.

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Bagpak Division INTERNATIONAL PAPER New York 17, N.Y.

Seaway Chemical Formed

Jerome Kritchevsky, who, until recently, was vice president and export manager of the Stepan Chemical Co., Chicago, has formed the Seaway Chemical Corp., Chicago. The new firm will be an export-import agency specializing in chemicals and, also, will represent Stepan products in foreign markets.

Prior to his association with Stepan, Mr. Kritchevsky had been president of Ninol Laboratories, Inc., which was purchased by Stepan in 1957.

St. Regis Adds Subsidiaries

The Lone Star Bag and Bagging Co., Houston, Tex., and the Wagner Bag Co., Salt Lake City, Utah, which recently were acquired by the St. Regis Paper Co., New York, will continue operations as subsidiaries of St. Regis.

West Coast Container Plant

A new manufacturing facility, Vulcan Containers Pacific Inc., San Leandro Calif., has been established to produce steel pails and round tinplate cans. Lawrence M. Furgeson, formerly sales vice president of Vulcan Containers, Inc., Bellwood, Ill., is president and sales director of the new company.

Richard E. Smith, formerly with Meyers Drum Co. and Rheem Mfg., both of California, has been named operational vice president.

Pest Handbook in 2nd Printing

Demand for the 200-page Plant Pest Handbook has made necessary a second printing of the $1 copy bulletin of The Connecticut Agricultural Experiment Station. Nearly 4,000 copies of the handbook have been purchased since distribution began in 1957. Several hundred copies have been supplied on request, without charge, to libraries, to State of Connecticut professional workers for official use, and to other research institutions throughout the country.

The handbook brings together information on pests and related injuries that occur on flowers, fruits, ground covers, shrubs, tobacco, meadows, small grains, and vegetables. Included are pests of 223 host plants, from abutilon to zinnia, arranged for quick reference. Authors are 12 entomologists and plant pathologists on the Station staff.

The 1959 printing is not a revision—the green-covered edition distributed since 1957 contains all of the information given in copies now available.

Frederick F. Rauch Dies

Frederick F. Rauch, sales representative for 23 years with S. B. Penick & Co., New York, died Oct. 22. He was 78 years old.

Calif. Weed Conference

Sacramento will be the site of the 12th annual California Weed Conference, Jan. 19 to 21. Conference sessions will be held at the Sacramento Memorial Auditorium.

Anti-Spray Writer Sees Light When Gypsy Moths Threaten

The following column is printed in its entirety from the "Lakeville Journal," a Lakeville, Connecticut, newspaper. It was written by Mrs. Josephine Nuese, a regular contributor to the "Country Garden" column of that newspaper. Mrs. Nuese had been firmly opposed to aerial spraying projects until the gypsy moth was discovered threatening Lakeville's own woodland.

To Spray or Not to Spray

"We don't know how other sections have fared during the past few weeks but the gypsy moth has descended upon our part of Cornwall in a dark tapestry of destruction. They hang from the trees like bead curtains, pattern the buildings, get in the hair, on the person. They have almost defoliated our flowering quinces, flowering crabs, roses, cotoneasters, and are now working their way through the maples. They have even moved into the house and are on the ceilings, walls, in the bedding, on the food. The other morning we found one on the living room table, thumb to nose, getting a good laugh out of the Connecticut Agricultural Experiment Station's 'Control of the Gypsy Moth.'

"Heretofore we have been firmly anti-spray and have given tongue to the same patter as all the rest of the anti-spray faction, the gypsy moth is on the wane; natural predators are getting them under control; they are no longer a threat; most of the spraying has been unnecessary anyhow . . . Well, we have come down out of that ivory tower fast. In this, as in most other matters, it makes a lot of difference whose arm is being twisted, whose garden is being defoliated.

"And, ironically enough, this current invasion has presumably come from a part of our own woodland which, last year, was pronounced an incipient danger point. Did we want to spray? No. We did not believe in sprays. Besides, the peak year was over and natural predators etc., etc., ad nauseum. Right now the most beautiful sound in the world is the drone of the helicopter as it works back and forth over adjacent woodland. We can't wait for it to get overhead and give us our money's worth of purification.

"Coincidentally, we have just found, with great amusement, the first draft of a long-winded and sober article prepared for this column some time ago on this gypsy moth spray-or-not-spray question. It was full of bombastic facts, the high-toned prose edging into the pseudo-scientific and trimmed with some dandy heart throbs. We tore it up with the greatest pleasure and relief. Nobody needs to probe the conscience any more on this matter because when the gypsy moth starts eating its way through your own garden you do just what everybody else does; you grab the nearest spray gun and yell for the helicopter.

"Anybody want some fine anti-spray propaganda?"

1

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Arizona Fertilizer Conference

The third annual Arizona Fertilizer Conference will be held January 20-21 at the University of Arizona Campus, Tucson, Arizona. The meeting is presented by the University of Arizona with cooperation of Soil Improvement Chemicals Association, and the National Plant Food Institute.

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Ohio Pesticide Meeting

The 13th annual meeting of the Ohio Pesticide Institute will be held Jan. 12 and 13 at the Lincoln Lodge, Columbus, Ohio. Samuel Alfend, chief of the Cincinnati District of the Department of Health, Education, and Welfare, FDA, will speak on "Progress Under the Miller Amendment."

Personnel of the Ohio Agricultural Experiment Station and Ohio State University will present research results with pesticides and application equipment as well as recommendations for 1960.

•

St. Regis Clupak Paper

Production of Clupak paper by the St. Regis Paper Co., New York, has begun at the company's Pensacola, Fla. mill. The paper is being made on the St. Regis' Pensacola Number 3, 212-inch wide machine, which has a production capacity of approximately 180 tons per day.

Seed and Fertilizer Clinics Attract 400 In Illinois

EIGHT seed and fertilizer clinics attracted 460 Illinois dealers and sales representatives during October and early November. Sponsored jointly by the Illinois Agricultural Extension Service, the Illinois Seed Dealers Association, the National Plant Food Institute, and the Illinois Fertilizer Industry Association, the meetings provide an excellent example of effective cooperation among educational and trade groups.

At each clinic, the University of Illinois Extension specialists presented the program. S. R. Aldrich, soils specialist, H. B. Petty, entomologist, and W. O. Scott, crops specialist, reported the latest information on field crops, soil insecticides, and fertilizers.

Dr. Aldrich declared many Illinois farmers don't get the yields they could from corn, even though they fertilize heavily and follow good supporting practices. The reason is that farmers fail to secure high enough plant populations. He suggested about 16,000 plants per acre for high moisture supplying soils and about 12,000 for low moisture supplying soils. Some fields end up with only 9,000 to 10,000 plants per acre, he asserted.

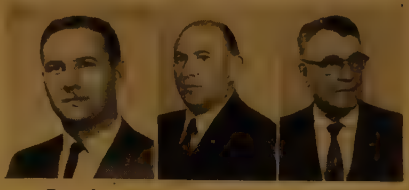
Dr. Petty reported that soil insecticide treatments before corn planting are becoming more popular. Broadcast applications of aldrin or heptachlor have proven more effective this year than concentrated band applications in the row, particularly in controlling cutworm and grape colaspis. He also mentioned that Thimet and Di-Syston may be on the market next season for Hessian fly control. These systemics have looked effective in stopping the wheat pest and may allow farmers wanting to seed wheat early to do so without causing a Hessian fly build-up.

Dr. Scott reported that the wheat drill box survey revealed many farmers were seeding low germinating wheat, and wheat that carried considerable amounts of weed seeds. He emphasized that there is a real opportunity for retail seed dealers to improve the yield and quality of small grains in their locality by making available high quality seed.

Dr. Scott also reported that new small grain and soybean varieties being increased in Illinois are: Monon, soft red winter wheat; Goodfield and Clintland 60 spring oats; and Lindarin soybeans.

The 1959 Clinics were held at Urbana, Springfield, Effingham, Benton, Macomb, Kewanee, Rockford, and Joliet. These sites enabled any dealer to have a meeting close at hand.

New Armour Appointments



Brooks **Foster** **Ziegler**

W. G. Foster has been appointed manager of the Columbia, S. C. Division of Armour Agricultural Chemical Company. Mr. Foster succeeds Paul J. Ziegler, who is retiring after 34 years of service as salesman and manager of the Armour Columbia Division.

In other personnel changes, Charles M. Brooks was named manager of the San Juan, Puerto Rico Division.

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Big Year for Crabgrass Killers

Although the new types of pre-emergence crabgrass killers are just getting out of the test marketing stage, retail sales in 1959 are expected to reach $12 million, quadruple sales of 1958, and about half of the total outlay for crabgrass control. More than 15 firms are now selling pre-emergence herbicides.

Dow Chemical Co. is reported to be preparing for further test marketing of a new crabgrass herbicide in five additional marketing areas this coming season. The new product has already been test marketed in three cities in 1959. After further evaluation, decision will be made as to the possibility of introducing it on a national scale.

Swift & Co. are also planning to bring out a new crabgrass herbicide, and are making plans for marketing the product.

•

Dorr Consultants, New Firm

A new firm of consulting engineers, Dorr Consultants, has been formed to provide engineering, financial, and management services to the chemical process industries. The offices are at 99 Park Ave., New York City.

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Floyd is W. Va. Service Mgr.

West Virginia Pulp and Paper Co., New York, has advanced John Floyd to the position of technical service manager for the Wellsburg, W. Va., and St. Louis plants of its multiwall bag division. Mr. Floyd joined the company in 1954.

Ninety Distributors Attend Hahn Sprayer Conference

Lloyd C. Hahn (center), president of Hahn, Inc., and Gilbert E. Betulius (right), sales manager, introduce Paul Townsend, business editor of the Evansville Courier, to the audience at the Hahn Distributor Sprayer Clinic.

More than 90 distributors and salesmen from all parts of the country recently attended a three-day distributor and sprayer clinic offered by Hahn, Inc., Evansville, Ind. The theme of the conference was "Step Up with Hi-Boy."

Lloyd C. Hahn, president of the firm, said that United States sales of Hahn Hi-Boy sprayers were 24 per cent above last year, although export business was down somewhat because of weather conditions in Mexico and because of a Canadian ban on MH-30.

The meeting was held in the new Vandenburgh County Rural Center in Evansville.

Ruled Not A Fertilizer

The Interstate Commerce Commission last month refused to rule that anhydrous ammonia, even though used for fertilizer purposes, is a fertilizer and entitled to move by rail under the lower freight rate applicable to fertilizers.

The issue was raised when the Edmunds Chemical Co., Albuquerque, N.Mex., filed a complaint with the commission that it had been overcharged by the Missouri Pacific Railroad on a shipment of the chemical. The ICC cited testimony that anhydrous ammonia is used for purposes other than as a fertilizer.

•

S. C. Plant Food Meeting

The tenth annual meeting of of the South Carolina Plant Food Educational Society was held in Clemson, November 9. The meeting was presided over by president J. Chiles Calhoun of Hartsville, South Carolina.

Highlights of the program were a discussion of "Equipment for Precision Seed and Fertilizer Placement" by Charles W. Gantt, research agricultural engineer of the USDA in Athens, Georgia. Dr. Gantt pointed out the importance of placement, emphasizing that more attention would have to be paid to this item by farmers in the future because of the increasing use of plant nutrients and the increasing plant nutrient content of fertilizer materials. Dr. Gantt's discussion was illustrated by an excellent set of slides which had been prepared by the American Potash Institute. The remainder of the program was devoted to a discussion of South Carolina's intensified soil fertility program.

The meeting ended with a tour of the Poole Agricultural Center, the Soil Testing Laboratory, the Fertilizer Department, the Green Houses, and the Processing Laboratory. That evening the social hour was given by the nitrogen producers after which the annual banquet took place. The featured speaker of the evening was Lieutenant Governor Burnet R. Maybank who discussed the importance of a sound agriculture to the entire economy of South Carolina.

•

Third Foreign Subsidiary

S. B. Penick & Co., New York, has organized its third foreign subsidiary, S. B. Penick & Cia. de Mexico, S. A., in Mexico City. The other two branches are located in England and France.

The operations of the Mexican branch will be under the supervision of A. J. Dotres, Director of Foreign Operations. Mr. Dotres also directs the activities of the English and French Branches from Penick's New York headquarters,

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NATA MEETING

(From Page 65)

cidents and helmets were in use in only 36 per cent of the accidents. Mr. Abbott said that a pilot should use as many safety features as possible.

Mr. Abbott said that CAB accident investigators in the field have recommended that operators be made responsible for maintenance of their equipment. In addition, it was recommended that records be kept of the number of hours a man sprays toxic materials.

Lloyd Nolen spoke on a "do-it-yourself" public relations program for applicators and said the best place to start is in the applicator's own community. In a lot of cases, he said, this has not been done. He said that applicators can make themselves available to speak at luncheons and before civic clubs in their own communities to tell the story of agricultural aviation. The NATA, Mr. Nolen continued, maintains sets of color slides that are available to all members for use in such talks.

Bankers and government agencies need to understand aerial application, Mr. Nolen said, and the chemical industry, itself, must be told the story of what applicators are doing. In closing, Mr. Nolen urged all aerial applicators to make a set of 35 mm. slides of their operations as an effective means of telling their story. J. H. Henley, an aerial applicator from Alice, Texas, displayed a very effective slide presentation which is used in conjunction with a tape-recorded narration that describes the use of aircraft to clear rangeland of hardwood vegetation.★★

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- Appendix – Physico-Chemical Properties of Sulphur

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Safety Training Clinics to Continue In 1960 Program of National Safety Council

by H. H. Slawson

THE National Safety Council's fertilizer section plans to continue in 1960 the series of training schools, which have proved so effective in getting an understanding of accident control principles into practical use throughout the industry.

This announcement, made at the section's annual meeting in Chicago, Oct. 19, was warmly applauded by the large crowd of plant saftey engineers and others in attendance. George L. Pelton, general chairman of the fertilizer section, said it is recognized that the training schools are the most effective means devised for getting a knowledge of accident prevention practices into the hands of supervisors and foremen who are in closest contact with the workers. Responsibility for conducting the schools, he said, has been fully assumed by the National Plant Food Institute, and the project is to be pushed to the utmost possible.

Reviewing highlights of the section's activities during the past year, Mr. Pelton, who is personnel director of Smith Agricultural Chemical Co., Columbus, O., reported a very encouraging membership increase. Two data sheets, setting up standards for safe handling of pesticide-fertilizer mixtures and explosives were developed and are now awaiting final approval by the National Council. Their release to the trade is expected soon, Mr. Pelton said.

Activities of the section were somewhat hampered because the Council had nobody available to serve as contact man at Chicago headquarters. This handicap has been removed by assignment of Marshall Peterson, as the Council's staff representative to serve the section.

Members elected the following officers: general chairman — Elmer C. Perrine, technical representative, Nitrogen Div., Allied Chemical Corp., New York; vice chairman — A. I. Raney, Phillips Chemical Co., Bartlesville, Okla.; and secretary — Gaither T. Newnam, Smith Douglass Co., Norfolk, Va.

Prof. Wm. N. Cox, Jr., of Georgia Institute of Technology, Atlanta, Ga., criticized the "patent medicine" approach to accident control. Too often, he said, the tendency has been to grab at methods that have been successful elsewhere, but which may or may not work effectively when applied in a presently concerned situation.

Prof. Cox, who teaches industrial and safety engineering at Georgia Tech's Schools of Engineering, recommended the "engineering approach" to accident prevention, starting with a clear cut, logical analysis of all problems before attempting solution.

The program, adaptable in any fertilizer plant, large or small, which he outlined includes three points: (1) Get the facts; (2) build the team; (3) solve the problem.

As to the first step — get the facts — Prof. Cox said most companies already have them in the inspection reports, and other legally required data, which will show what is going wrong. Don't overlook the possibility, he suggested, of also obtaining outside information on accident control, available from the National Safety Council's resources, the U. S. Labor Department, trade associations and others.

Much of this material, he added, will be in the "raw" form, but it will not be too much of a job to classify, analyze and summarize it in a shape which the supervisor can use. Without the facts to start off with, he warned, "Your safety efforts will be close only to the guessing stage."

Moving to point two — build the team—Prof. Cox said no safety department alone will be able to control accidents in a plant. This can be done only if every worker has an active part in the program. Supervisors and maintenance people, he said, are often called on for other services, so why not call on them to help in pushing the accident prevention effort.

He recommended utilization of every opportunity to capitalize on all mankind's inherent vanity and desire to feel important. See to it, he said, that every outstanding effort by individuals to further the safety program is given adequate public recognition. This, he declared, would go far in building team action to "make safety work."

Getting down to the final step in the engineering approach to accident prevention, Prof. Cox said that in seeking ways to eliminate hazards, as they have been revealed under point one, faster progress can be made if a priority list is first drawn up. Pick out the most important accident problem in the plant, then lick it and go on to the next critical problem on the list, he advised.

It is very likely, Prof. Cox went on, that most of the trouble found in the plant can be lined up under three categories. These he listed as: falls of persons, machinery accidents and mishaps in handling materials. In fertilizer plants, too, chemicals are an important factor to be considered, he added.

"If the fertilizer industry is to continue showing improvement in reducing fatalities and disabling accidents," Prof. Cox summed up, "its efforts must be placed on a sound basis. This three-point program may not be the answer to all your problems, but it is a starting point from which you can expand these efforts effectively."

Albert E. Walker, regional supervisor, Travelers Insurance Co., New York, in a paper entitled "Have We Forgotten the Fundamentals?" read an excerpt from a report made to his company in

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1927. which voiced criticism of the safety movement that sounded similar to what is heard today.

One of the biggest handicaps to progress in accident prevention, Mr. Walker asserted, has always been the failure to enlist full executive interest and support of safety. "That may be our fault," he declared. "We don't give top management what they need to know before we can get the support that is so essential."

Emerson M. Jones, Jr., midwest technical services director of Allied Chemical Corp.'s Nitrogen Division, asked a pointed question in his paper on "Avoiding Potential Hazards in the Use of Nitrogen Solutions."

"Every one of us knows that nitrogen solutions can be dangerous if not properly handled," he said, "We know the techniques for safe handling. Why, then, do we continue to have accidents?"

Answering himself, he declared it's because supervisory personnel, after issuing instructions on safe handling, fail to follow up and see that the worker uses the proper method and the proper protective equipment. "It's true, said Mr. Jones, "that most plants provide their workmen with protective devices and garments. But rarely do they follow-up and insist that this equipment be used."

How can management make sure that the worker takes care of himself in hazardous situations? The answer to this, he declared, is to make it a company policy that the equipment is used and maintained always in usable condition. If this isn't done, he emphasized, then the negligent worker should be held responsible for any accident.

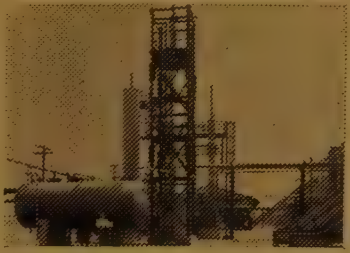
Briefly reviewing "everyday hazards" around fertilizer plants, Mr. Jones touched on the importance of special care when connecting or disconnecting tank cars. This operation should never be done by one man alone, he said. Standing by should be a helper, who could give vital assistance if needed at this critical spot.

"Watch your valves" was another recommendation. Diaphrams should be checked regularly and replaced if a rupture seems possible.

In welding operations, Mr. Jones advised "Be overcautious and you'll be quite safe." Among other situations where trouble could arise, he mentioned frozen solution lines in the winter time, or when steel tanks are being replaced by aluminum ones.

"Never apply heat to any equipment carrying nitrogen," he advised. "Empty the equipment first and be sure it's clean before you start welding."

In the changing techniques of fertilizer manufacture, Mr. Jones went on, sulfuric acid is being used increasingly. Quite often, bad connections may have been made somewhere along the line, and the worker is totally unaware of this until something happens. Mr. Jones also discussed the importance of having relief valves always in working condition in any anhydrous ammonia system.



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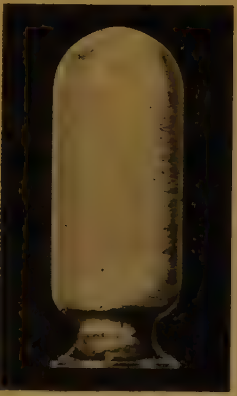

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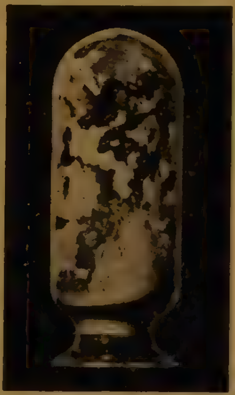

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WASHINGTON REPORT

(From Page 70)

$550 million to $600 million at the users' level.

By this move industry leaders hope legislators and the general public will begin to appreciate the true size of the industry. The next step some industry leaders are talking about will be to work up estimates on the value of the industry's products to major sectors of the national economy, including agriculture and the food industry, and forestry pulp and paper industry.

* * * * *

A revolution in the pesticides industry may be brewing in USDA's Entomology Research Division. Not a big revolution, to be sure, but one which could add to man's methods on insect control and bring into use some chemicals now discarded as impractical for pest control.

The key to this revolution can be found in what Dr. Edward F. Knipling, Director of ARS's Entomology Research, calls "broadening the scope of research." While scientists are continuing work on chemical and biological controls, they are also starting to probe more deeply into a number of new methods.

Among the new insect control materials under study are pathogens, attractants, sterilants, and hormones. Of special interest to pesticide makers is USDA's current plan to reevaluate a number of chemicals which have been set aside because of their low knockdown characteristics.

What USDA is looking for in this area are chemicals which can be applied at an insect's larval stage and which may permit the larvae to live, but will prevent development of the larvae into destructive adult insects. If this method of insect control proves practical, a number of new chemicals or even new kinds of chemicals may find a profitable place in insect control.

No one is saying that attractants are a new idea in insect control. Some kinds have been used for years to lure flies to their doom. Attractants were used to help eradicate the Medfly in Florida, and are being used to trap and detect the gypsy moth in the Northeast. Poison bran has been used for years in grasshopper control.

The new research is not seeking new food attractants, which may be consumed by wildlife and pets as well as by the target insects. Rather, the new research is aimed at discovering what might be called sex attractants. The gypsy moth attractant is one of these. If sex attractant can be discovered and synthetic attractants can be produced, men will have a material with a high degree of specific action.

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At least, this is what researchers hope to find. Already USDA is planning an eradication experiment on an isolated Pacific Island using attractants to lure male Oriental fruit flies to their death. Attractants, of course, merely lure the insects — in the manner of a fatal perfume — into contact with the insecticide which wipes them out.

Significantly, attractants specific enough to lure one species of insect would, when they could be used, virtually eliminate any problem of residues or of hazard to wildlife. They would not affect predators and parasites, and, of course, would continue to depend upon chemical insecticides to do the actual eradication.

Research scientists admit that their search for both nuclear and chemical insect sterilants has been given a big push by the success in eradicating the screwworm in Florida. Sterilants, again, would be highly specific, as would be other fields of research into hormones and pathogens.

What this research promises in the decade ahead is a broadening horizon for the pest control industry, and further progress toward making pesticides more specific as weapons against unwanted pests. New research also holds possibilities for the development of profitable as well as new products.

* * * * *

The hope of some wildlife enthusiasts that the failure of Alabama to approve a $5,00,000 appropriation for fire ant eradication in the state over the next two years will halt the federal-state ant eradication program in the South is way off base.

Real reason for Alabama's failure to make the appropriation is lack of state funds, due in large part to reduced revenues resulting from the 116-day-long steel strike. According to information received here in Washington, Alabama officials are willing to testify before Congress in favor of continuing the program if wildlife groups try to make Alabama's inability to appropriate money for it an issue next year.★★

EDITORIAL

(*From Page* 29)

often disregarded today, is that ten percent of every ad budget for a consumer product should be invested in pre-selling the product to the agencies through whose distributional chain it will pass on the way to the eventual user. A form of insurance policy to guarantee that the remaining ninety percent of the budget will have a chance to do its job.

All of which brings us around to the case in point. Spencer Chemical is introducing a new post-emergence herbicide. In marketing the new product, says H. E. Bingham, who will be in charge, they will follow a plan of using supervised distributors who will have the advice of technically trained Spencer personnel to coach selected farmers in proper use of the new product. "We realize only too clearly," he said, "that misuse by a few farmers in an area can prevent others from trying the product."

As with many of the new chemical tools being introduced, the chemical must be applied at just the proper time and in just the correct amount if it is to perform efficiently. It is obviously highly important to the success of any new product that those who will be concerned in any fashion with it on its way to the eventual end user must know what it is, how it is supposed to work, what can go wrong with it and what performance can logically be expected with it. An ad campaign that concentrates exclusively on the end user, it occurs to us, is to borrow Mr. Mortimer's metaphor, like trying to swim the last hundred yards up onto the beach, without first getting across the ocean.

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★ *Uniform* — Ground in a continuous mill and then treated in an air separator to remove oversize particles, 92 to 95% of the resulting product will pass a 325 mesh screen. Average particle size is below 5 microns. Weight, 32 lbs. per cu. ft. Because of its favorable physical characteristics and uniformity it forms homogeneous mixtures with pesticides and will not, like some other diluents, settle out from the active ingredients upon standing.

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FOREST INSECTS

(*From Page* 69)

sin, aerial and ground surveys showed about 10,000 acres of pine oak forests heavily defoliated by a walkingstick. Defoliation on another 1,200 acres was classified as moderate. Bark beetles were responsible for causing partial and complete kills of ponderosa pines, singly and in groups of 2-5 trees in about 10,000 acres of trees in Miami and Bass Lake areas of the Sierra National Forest, California. The infestations were associated with earlier heavy snow breakage. In the generally infested area, broken tops were treated during the spring along roadways. A bark beetle was responsible for partial or complete kill of single Jeffrey pines over a 9,000 acre stand in the Monache area of the Mt. Whitney district, Inyo National Forest, California.

Miscellaneous Activity in Oct.

THE cabbage looper in early October was serious enough on collards in sections of Baltimore County, Maryland, to require treatment. In Louisiana, cabbage was heavily infested by the insect throughout the state, and in New Mexico it continued to be a problem in Dona Ana County lettuce fields. Late green beans in Sussex County, Delaware, and in Erie County, Pennsylvania, were reported damaged by the European corn borer. Second to fourth instar larvae were very abundant and causing severe injury to pepper pods and plant stalks in untreated pepper fields throughout Delaware. Infestations were also reported on peppers in Lawrence, Beaver, and Mercer Counties, Pennsylvania.

The screw-worm eradication program, which has been conducted in Florida and the southeastern states during the past two years, has now been brought to an apparent successful close. No screw-worms have been taken in Florida since June 17. The plant used in the production of sterile flies was closed in early November. During October, several screw-worm cases were reported from Louisiana. One case of screw-worms causing nasal myiasis in man was reported from Cushing, Oklahoma. Two cases were reported from cattle in Pushmataha County, one from Marshall County, Okla., and several from Nebraska.

The rice weevil has caused heavy field infestations in DeWitt County, Texas, corn this year. Eight to ten thousand bushels of stored corn in the same county were reported to have heavy infestations. All known infestations of khapra beetle in Texas have now been fumigated. A total of 21 infested properties had been found in Texas since the initial find early in 1959.★★

INVENTORY CONTROL

(*From Page* 34)

record keeping, but more important is the proper interpretation of data by management. Turnover, percentage of value, time and dollar limits, physical counts, and forecasting are the tools with which management should be thoroughly familiar★★

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PAN GRANULATORS

(*From Page* 32)

content of the granular product is an important factor.

Operating characteristics of the pan may be affected by altering the positions of the solid feeder and liquid spray nozzles; also, by modifications in design or position of scrapers, spreaders, and deflectors within the pan, or the height and shape of the rim. Aside from the classifying action peculiar to the inclined pan, the rolling and cascading action imparted to the material being agglomerated essentially is the same as that obtained by the use of a rotary cylinder. The principles of agglomeration which involve the progressive gathering of small particles into a larger interlocked structure, or granule, are the same in either piece of equipment.

Ammoniation

REPPERT (*8*) granulated mixed fertilizers in the inclined pan by spraying the mixture with aqueous ammonia. The products obtained were reported to be physically stable and to have good storage properties. The first commercial operation of the equipment for granulating mixed fertilizers in North America was begun in the fall of 1958 by William Houde Ltd., La Prairie near Montreal in Quebec, Canada (*1*). In a pan 15 feet in diameter, inclined at 45°, and rotating at 14 r.p.m., such low nitrogen grades as 2-12-10, 5-10-13, and 4-24-20 are successfully granulated at the rate of 10 tons per hour. Nozzles for spraying ammoniating solutions on the premixed solids are shrouded with metal funnels about 12 inches in diameter. The pan is equipped for spraying acid into the bed surface. It is planned to carry our experimentation with the production of higher nitrogen grades in this equipment.

In tests with an experimental tilted pan, 3 feet in diameter, Hignett (*5*) reports that good granulation of ammonium nitrate was obtained by spraying a hot, concentrated solution on the fine crystalline salt. As much as 85% of the product was in the particle-size range of 6- to 16-mesh. This again illustrates the adaptability of the inclined pan to the granulation of individual materials. Results were less conclusive when Hignett compared the operation of the inclined pan with the continuous rotary ammoniator in tests with 10-20-20 mixed fertilizers prepared with triple superphosphate, potassium chloride, ammoniating solution and sulfuric acid. The results were generally poorer in the pan granulator; the ammonia loss was high (19.2% vs. 2.8%); the yield of on-size product (6- to 28-mesh) was not as good (57 vs. 69%); subsurface liquid distributors tended to interfere with the classifying action of the pan and, when acid was sprayed on the surface of the bed, severe fuming occurred. On the basis of these tests it was considered unlikely that the inclined pan would have any significant advantage over the continuous rotary ammoniator. However, most of the difficulty in these tests seems to have been experienced with ammoniation and acid addition rather than with agglomeration. In many installations for making high-analysis mixed fertilizers, the continuous rotary ammoniator is used in conjunction with a separate unit of equipment for granulation of the ammoniated product. In the usual granulating procedures for mixed fertilizers there appears to be considerable benefit in ammoniating at somewhat lower moisture content than is required for agglomeration and then completing the formation and compaction of the granule in an elongated second section of the same equipment or a separate granulating unit. No data are available on such use of the inclined pan as a secondary unit for the granulation of highly ammoniated mixtures. Plant practice with high rates of ammoniation has confirmed the conclusion that the introduction of anhydrous ammonia or ammoniating solutions and acids at the surface of the bed, either in pug mills or rotary cylinders, is far less satisfactory than

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when these liquids are introduced through sub-surface spargers; loss of ammonia is higher, fuming is more severe, and liquid distribution is less uniform. Assuming future development of sub-surface solution spargers that could be placed in the deep bed of material in the inclined pan without interference with its classifying action, it remains evident that the material above the point of solution injection tends to be granular in nature and therefore less efficient in ammonia absorption.

Reaction of ammonia with acids is rapid and should present no problems in the inclined pan, but adequate ammoniation of superphosphate in mixtures requires a contact period of a minute or more before the mixture can be fully exposed to the surroundings without ammonia loss. Therefore, assuming that the fine material at the bottom of the deep bed is receiving the solution injection, it appears likely that its rapid movement into the thin layer at the high side of the pan would tend to cause incomplete absorption and result in appreciable ammonia loss. In consequence, in its present state of development, the inclined pan does not appear to meet the requirements for an efficient ammoniator in conjunction with granulation of the highly-ammoniated mixtures commonly produced in the United States.★★

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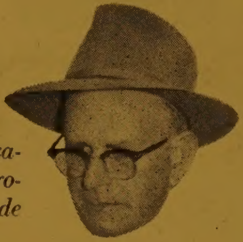
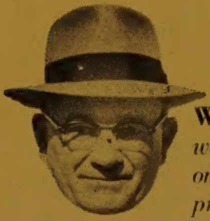
THESE MEN HAVE LEARNED FROM EXPERIENCE THAT TOXAPHENE MAKES DOLLARS...AND SENSE

Hartford Jackson, Columbia, La. *"I set about the best cotton crop I have ever seen, following the toxaphene, toxaphene-DDT control program . . ."*



D. L. Hall, Eudora, Ark. *"The toxaphene and toxaphene-DDT control program certainly worked for me, and made me money . . ."*



W. E. Moore, Sherrill, Ark. *"We were able to pick cotton two weeks earlier on the acreage where we followed this program. It really paid off for us . . ."*

H. C. Bradney, Montrose, Ark. *"This program saves me expensive late-season applications and does an excellent job. Last year I cut my insect control costs in half . . ."*

O. L. Cox, Ruleville, Miss. *"I got on the toxaphene program early in the season and continued on a regular schedule. I believe those six early applications paid more dividends than anything we did with our cotton crop all year long . . ."*

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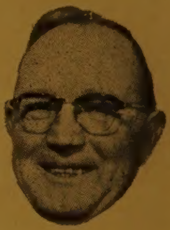
P. E. Cloutier, Bermuda, La. *"We set one of our best crops last year, and we think the toxaphene, toxaphene-DDT insect control program was a big factor. We're basing our 1959 program on the same plan . . ."*



Morris A. Roberson, Gilliam, La. *"I like the early production and early harvest that comes with the toxaphene insect control program. We had good control all season, and I plan to use the same program this year . . ."*

Clarence R. Smith, Cleveland, Miss. *"We believe in this program. It gave us excellent insect control, saved us money, and helped us make a cotton crop under adverse conditions . . ."*

O. L. Garmon, Jr., Marks, Miss. *"I used the toxaphene program on more than 700 acres of cotton. I know you need to get the overwintered boll weevil, and this program does that. I had good insect control all year . . ."*

Insecticide salesmen have to do more than just take orders for dusts and sprays. In the Mid-South, for example, progressive formulators and dealers are showing cotton farmers how a planned, season-long insect control program based on toxaphene can be the most satisfactory—and profitable—practice. These statements from farmers already following such a program reflect the growing interest in more effective use of insecticides.

TOXAPHENE

A product of the Agricultural Chemicals Division
HERCULES POWDER COMPANY
INCORPORATED
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